Dialogic® Diva® System Release 8.5LIN

Reference Guide

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Dialogic® Diva® System Release LIN Reference Guide

This guide provides a detailed description of how to install and configure the Dialogic® Diva® System Release software, and how to troubleshoot your ISDN connection, if necessary. This guide covers the following subject matter:

- The Diva System Release software features, supported hardware, and system requirements.
- Installation and configuration of the Diva System Release software with Dialogic® Diva® PRI, BRI, and Analog Media Boards. Loading Dialogic® Diva® modules: TTY driver (analog, fax, V.110, and V.120 capabilities) and CAPI 2.0 support. Testing Diva Media Board function and connection.
- Configuring the Dialogic® Diva® TTY serial ports: AT commands to configure the Diva TTY serial ports, setting up a Linux server to accept digital or analog connections.
- Uninstalling the Diva System Release software.
- Troubleshooting: ISDN trace utility and customer support procedure.
- Management interface description: Directories and variables that can be read, written, or used to generate events and to control board status and configuration.
- Features: Overview of the functions provided by the various interfaces.

This guide does not describe the installation, configuration, and usage of the Dialogic® Diva® softSS7 software, the Dialogic® Diva® SIPcontrol™ software, or the Dialogic® Diva® softIP software. The documentation for these products can be viewed in separate documents.

Syntax used throughout the guide

<Variable>	Variables that must be entered are enclosed in angle brackets. Variables may consist of numbers or other character strings.
[Opt]	Optional entries are enclosed in square brackets. They may consist of variables, e.g., <number> and character strings.
a1|a2	Alternative entries are separated by a vertical line (pipe character).

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About the Dialogic® Diva® System Release Software

The Dialogic® Diva® System Release software enables you to use your Dialogic® Diva® Media Board with Linux, such as to provide analog, digital, and fax modem emulation over TTY, a CAPI 2.0 interface for ISDN-based applications, an ISDN Direct Interface (IDI) for access to the management interface, and B- and D-channel tracing utilities. Additional software provides integrated support for the SIP and SS7 protocols.

Features

The features list includes information about:

- ***General features*** on page 10
- ***Fax and voice features*** on page 11
- ***VoIP features*** on page 11
- ***Q.SIG features*** on page 12
- ***Dialogic® Diva® TTY driver*** on page 13
- ***CAPI 2.0 support*** on page 13
- ***Licensable features*** on page 14

General features

The Dialogic® Diva® System Release software offers the following features:

- RAS connection to a Linux-based RAS server from digital, analog, and mobile networks with only one telephone number
- LAN-to-LAN connection with a transfer rate of 64/56 kbps or 128/112 kbps for Dialogic® Diva® BRI Media Boards, 2 (E1) or 1.5 (T1) Mbps for Dialogic® Diva® PRI Media Boards, and 56 kbps for Dialogic® Diva® Analog Media Boards
- Fax, voice, or unified messaging server
- Support for B-channel protocols: HDLC, X.75, X.75 with V.42bis, V.120, V.120 with V.42bis, ISO8208, T.70/T.90NL, LAPD, X.25, V.110 (up to 56 kbps), PIAFS 1.0 and 2.1, SMS modem ETSI V1,V2 and auto-detection, Dialogic® Diva® Fast Setup, SDLC
- Change of used B-channel protocol on demand
- Independent ports and channels, any combination of B-channel protocols possible
- V.90 analog modem connections with V.42/LAPM (error correction) and V.42bis compression
- Automatic synchronous/asynchronous conversion
- Automatic detection of incoming call type (Generic modem only)
- Support for the known D-channel protocols (switch types)
- Support for Q.SIG protocol
- Change of selected D-channel protocol or related parameters on demand via the management interface, without driver and Dialogic® Diva® Media Board restart
- Support for numerous supplementary services
- Support for lines with a transfer rate of 64 and 56 kbps, e.g., USA
- Support for fractional lines
- Advanced call routing configuration to distribute incoming calls between applications
- Automatic detection of Diva Media Boards during configuration
- Dialogic® Diva® Configuration Wizard for easy Diva Media Board configuration
- Up to 240 B-channels can be used simultaneously (up to 8 Dialogic® Diva® Media Boards in a system)
- Dialogic® Diva® ISDN serial driver (modem emulation) provides a rich AT-command set and supports Fax Class 1 and Fax Class 2 AT commands
- Support for CAPI-based applications through CAPI 2.0.
- Support for IDI (ISDN Direct Interface)
- Management interface for access to call state, status, statistics, and line or interface events
- B-channel and D-channel data trace (send and receive) capability through the management interface
- M-Board: Middleware between Diva Media Boards and interfaces (CAPI and COM port)

Fax and voice features

- Fax Class 1 and 2
- Fax and voice support via CAPI
- Fax sub-addressing (SUB), polled document selection (SEL), password (PWD), non-standard facility frames (NSF)
- Fax compression (MH, MR 2D coding, MMR T.6 coding) and error-correction mode (ECM)
- SFF and plain text (ASCII) support
- Fax connections up to 33.6 kbps (V.34)
- Fax polling
- Extended fax operation
- Fax tone detection
- Reversal of fax direction
- Dynamic switching of B-channel protocols
- DTMF/MF transmission and detection
- DTMF/MF clamping
- Extended tone processing (human talker detection, generation and detection of country-specific tones)
- Cross-board switching via interline connect (DSP-based monitor, bridge, and mixer for voice connections: supports multiline conference calls)
- Page formats: ISO A4, ISO B4, ISO A3, special page formats
- Standard, fine, super-fine, and ultra-fine resolution
- Echo cancellation (G.168, up to 128 ms tail length)
- Real time protocol (RTP)
- Dynamic anti-jitter buffering
- Comfort noise generation (CNG)
- Voice activity detection (VAD)
- Support for color fax (JPEG format) via CAPI

VoIP features

- Echo cancellation (G.168, up to 128 ms tail length)
- G.711 (A-Law and u-Law), G.723 (low and high rate), G.726, G.GSM voice compression on the digital signal processor (DSP)
- Transcoding
- MCU functionality (conference, mixer, interconnection)
- Real time protocol (RTP) processing on the Dialogic® Diva® Media Board's RISC CPU
- Dynamic anti-jitter buffer processing on the Diva Media Board's RISC CPU
- Comfort noise generation (CNG)
- Voice activity detection (VAD)
- DTMF/MF tone processing (in band, out of band)
- Enhanced tone processing (e.g., 390 Hz for VoIP answering machine, country-specific tones)

Q.SIG features

- Basic call (64 kbps unrestricted, 3.1 kHz audio and speech bearer services) ECMA 142/143
- Line identification presentation ECMA-148
- Name identification presentation ECMA-163/164
- Generic functional procedures ECMA-165
- Call deflection (call rerouting) ECMA-173/174
- Call transfer ECMA-177/178 (only with working path replacement)
- Path replacement ECMA 175/176
- Advice of charge ECMA-211/212 (incl. configuration "while/end of call")
- Message waiting indication ECMA-241/242
- Common information ANF ECMA-250/251
- Single step call transfer ECMA-299/300
- Simple dialog ECMA-310/311
- Redirected number translation from Q.SIG to Q.931
- Several Q.SIG derivatives (ECMA-QSIG, ISO-QSIG, Alcatel, Ericsson)
- Indefinite length of IEs (to support more switches like Lucent)
- Segmented message up to 8 segments incoming and 8 Rev.2, 2 Rev.1 outgoing
- Physical and logical CHI format for PRI trunks
- Configuration of Q.SIG settings (CHI, CR, CHI format) for BRI trunks
- Physical and logical CHI format for PRI trunks
- Redirecting Number Emulation
- T1-Q.SIG (Q.SIG for PRI T1 trunks)
- Siemens-specific protocol dialects, tested with Siemens Hicom 150/300 BRI & PRI
- Ericsson-specific protocol dialects. MD110: Path replacement QSIG-PR (ISO/IEC 13863/13874) with software version BC 11 (latest version), CTPR, MWI in UUI on MD110 (BC10/CNI138(=SP)- ECMA, BC11/SP4-ECMA+ISO) (without or with CLC analog). BP250: ETSI trunk MWI in UUI (CLC analog)
- Alcatel-specific protocol dialects, tested with Alcatel 4200/4400/4410 BRI and PRI
- Nortel-specific protocol dialects, tested with opt11 Rev23, Nortel Meridian PRI
- Matracom-specific protocol dialects, tested with Matra 6500
- Lucent-specific protocol dialects, tested with Lucent Definity

Dialogic® Diva® TTY driver

The Dialogic® Diva® ISDN serial driver provides access to analog, digital, fax (FAX CLASS 1 and FAX CLASS 2 with ECM, compression, and polling support), V.110, B-channel protocol detection, caller ID, and voice capabilities of the Dialogic® Diva® Media Boards by providing a standard serial driver interface. This allows for using Diva Media Boards in a variety of configurations:

- As a "one number" Remote Access Server (RAS) with automatic protocol detection and ASYNC/SYNC framing conversion, allowing multiple incoming analog, digital, and wireless connections. These connections may be simply login sessions or IP (Internet Protocol) over PPP (Point-to-Point protocol) connections.
- As a fax polling server, in combination with third party fax software that works with fax modems. Supports polled document selection and protection.
- As a WAP (Wireless Application Protocol) gateway or WAP application server, using the V.110 protocol (or combined with a RAS server).
- As a wireless application server, using the PIAFS protocol (or combined with a RAS server).

The status of the exposed driver ports by the Diva TTY can be controlled using the ***Dialogic® Diva® TTY management interface directory (Port Manager)*** on page 79 of the driver, that is accessible using WEB-based management interface browser or using the mantool command line utility, see ***Management interface access and monitoring utility*** on page 74 for more information.

CAPI 2.0 support

The CAPI 2.0 (Common ISDN Application Programming Interface) driver allows CAPI-based applications to be used with Dialogic® Diva® Media Boards. It also provides a mechanism for the development of customized applications enabling you to use the capabilities of ISDN. For full information on the CAPI interface specification, refer to the ***CAPI Association*** http://www.capi.org web site.

Supplementary services supported by the Dialogic® Diva® CAPI 2.0 driver [1] :

The availability of supplementary services depends on your switch or PBX.

- Call offering services: TP, CFU, CFB, CFNR, call deflection
- Call completion services: CW, HOLD, ECT, CCBS, CCNR
- Charging services: AoC
- Three-party conference
- Others: User-to-user signaling
- Hunt-group support

Licensable features

For the following features you need to purchase a license:

Licensable features for the Dialogic® Diva® Media Boards, except the Dialogic® Diva® 2FX Media Board

Support for G.729 incl. Annex A and Annex B voice codec

Licensable features for Dialogic® Diva® V-2PRI and V-4PRI Media Boards

- Support for RTAudio voice codec with default bit rates: 24 kbps for 16 kHz and 8.8 kbps for 8 kHz
- Support for AMR-NB voice codec
- Support for G.729 incl. Annex A and Annex B voice codec
- Support for the following fax and modem features. These licensable features are divided into three groups:

1. TDM fax support, up to V.34 (33.600 bps and lower bit rates)

- Support for Fax G3, T.30, V.34 HDX, V.17, V.29, V.27ter, V.21, V.34
- Fax Compression MH, MR, MMR
- Error Correction Mode ECM
- Fax Polling
- Reversal Fax Direction
- Fax Password, Sub Addressing, "new header line"
- Page Formats A4, B4, A3
- Resolutions fine, super fine, ultra fine
- Color Fax JPEG format
- T.38 FoIP (PSTN - IP Gateway mode)

2. TDM fax support, up to V.17 (14.400 bps and lower bit rates)

- At the most, half of the available channels can be licensed for these fax features.
- Support for Fax G3, T.30, V.17, V.29, V.27ter, V.21
- Fax Compression MH, MR, MMR
- Error Correction Mode ECM
- Fax Polling
- Reversal Fax Direction
- Fax Password, Sub Addressing, "new header line"
- Page Formats A4, B4, A3
- Resolutions fine, super fine, ultra fine
- Color Fax JPEG format
- T.38 FoIP (PSTN - IP Gateway mode)

3. Data modem support, up to V.90

- modem modulations POS up to V.90 (Client and Server side)
- V.21, V.23, V.22, V.22bis, Bell 103, Bell 212A, V.32, V.32bis, V.34, V.90, including error correction MNP, V.42, SDLC and compressions V.42bis, MNP 5
- POS modulations V.22 FC, V.22bis FC, V.29 FC
- Text telephone modem: V.18, V.21, Bell 103, V.23, EDT, Baudot 45, Baudot 47, Baudot 50, DTMF

- Extended modulations V.23 half duplex, V.23 on hook (SMSC mode), V.23 off hook, Bell 202 (POS), Telenot

System requirements

The following requirements have to be met for the installation of the Dialogic® Diva® System Release software:

- A PC-compatible computer (pentium processor or higher with at least 500 MHz and 128 MB RAM). Verify specific requirements for your Dialogic® Diva® Media Board at the Dialogic web site ***www.dialogic.com*** http://www.dialogic.com.
- An installed Linux system
- At least 80 MB of free space on the drive on which your Linux system is installed
- An installed Diva Media Board or valid licenses for the Dialogic® Diva® softIP software

Installation and Configuration

Note: If you upgrade from the Dialogic® Diva® System Release software v8.3, the existing configuration cannot be used due to structural changes. A backup of the configuration is stored under divas_cfg.rc.8.3.

The following steps provide an overview of the installation and configuration procedure for the Dialogic® Diva® System Release software:

1. Install your Dialogic® Diva® Media Board and connect it to the network. For further information on the hardware installation, refer to the Dialogic® Diva® Media Board Installation Guide that came with your Diva Media Board.
2. Install the Diva System Release software package. For further information, see ***Software installation*** on page 16.
3. Configure the Diva System Release software using the **Config** Configuration Wizard located in the /usr/lib/opendiva/divas directory. For further information, see ***Configuring the Dialogic® Diva® System Release Software*** on page 22.
4. Confirm the operation of your Diva Media Board. For further information, see ***Testing the Dialogic® Diva® Media Board functionality and connectivity*** on page 33.
5. Configure the Diva System Release software TTY devices. For further information, see ***Configuring the Dialogic® Diva® TTY ports*** on page 35.

Software installation

The Dialogic® Diva® System Release software can be installed on a wide range of Linux distributions.

The software consists of an integrated installer, providing automatic detection of the presence and type of the system package manager:

- On RPM-based systems, the packages are automatically installed using rpm
- On Debian-based systems, the packages are automatically converted to a .deb-format and installed using dpkg

To install the software follow these steps:

1. Ensure that you are logged in as "root" user (or use "su -").
2. Run the following command in a terminal window to start the installation: **sh <download path>/Diva4Linux_installer_<nnn>.bin**
   - Where <download path> is the path where you stored the downloaded installer package. and <nnn> is the software version and build number.
   - Using the command line switch -t <path> you can specify the temporary working directory for the installer. The default is /tmp/divas.
3. Follow the instructions on the screen. The installer will search for previous versions of the software and allow uninstallation prior to installing the packaged versions. The configuration files and licenses will be retained.
4. Move into the source directory where the files have been extracted into: **cd /usr/lib/opendiva/divas/src**
5. Start the build process: **./Build**

Files included in the package

The following files are included in the package:

- Device driver for active Dialogic® Diva® Media Boards (divas.[k]o, divadidd.[k]o, diva_idi.[k]o)
- CAPI 2.0 interface (divacapi.[k]o, kernelcapi.[k]o, capi.[k]o)
- Dialogic® Diva® TTY (COM port) interface (Divatty.[k]o)
- The divactrl utility is used to download the protocol code of active Dialogic® Diva® Media Boards, to configure, and to start Diva Media Boards, to read and translate messages from the board's XLOG interface, to create a core dump of the board's memory, to control the board via the management interface and to read and translate messages from the board's MLOG interface (**divactrl**).
- Protocol code for Dialogic® Diva® PRI Media Boards and Dialogic® Diva® Multi-PRI Media Boards (*.pm, *.pm2, *.qpm files and *.bin files)
- Protocol code for Dialogic® Diva® BRI Media Boards (*.sm, *.sm.4, *.2q0 files, *.bit files and *.bin files)
- Protocol code for Dialogic® Diva® 4BRI Media Boards (*.qm?, *.2q? files, *.bit files and *.bin files)
- The tty_test utility allows you to test the TTY interface, to monitor link quality and Dialogic® Diva® Media Board performance, and to test the hardware (**tty_test**). This utility uses the TTY interface.
- ISDN file server, client, and remote management application that uses the ACOPY protocol and allows you to transfer files, create, remove, or list directories and execute commands on a remote station (**acopy2**). This utility uses the CAPI 2.0 interface.
- A fax application that allows you to transfer and poll fax documents in text and SFF formats with various transmission speeds and various ECM/compression settings (**testfax**). This utility uses the CAPI 2.0 interface.
- Dialogic® Diva® Configuration Wizard detects the hardware and automatically creates the configuration script (menu driven tools, includes the files Config, Start, Stop, Config.dlg, cfg_util.sh and others). The Diva Configuration Wizard is started by executing the **Config** shell script.
- Shell script used by RPM to create or delete the symbolic links that enable the Dialogic® Diva® System Release software drivers to be started automatically at system startup (**cfg_util.sh**) and to enable/disable the configuration web server.
- Dummy Dialogic® Diva® configuration file. This file is used to generate warnings if the user forgets to configure the Diva System Release software after installation (divas_cfg.rc). This file is overwritten by the Diva Configuration Wizard once the configuration procedure is invoked.
- Shell script to capture information about your system, hardware, or installation if you have problems to install, configure, or start the Diva System Release software (**Support**). This shell script generates a file named report.txt. You can examine and modify this shell script if it registers information, e.g., phone numbers that you do not want to pass on to the Dialogic Customer Support. If you change the script, please send us the modified version together with the report.txt file.
- **Trace** shell script that can be used to read driver and Diva Media Board traces for debug purposes.
- Shell script stops and unloads Dialogic® Diva® drivers (**divas_stop.rc**).
- **xlog** that contains **divactrl load -ReadXlog $*** and can be used to read XLOG traces from the Diva Media Board.
- **mlog** shell script that contains **divactrl mlog $*** and can be used to read MLOG traces from the Diva Media Board.
- **mantool** shell script that contains **divactrl mantool $*** and can be used for management interface access.
- **divaload** shell script that contains **divactrl load $*** and can be used to control the Diva Media Board.
- **divalogd** call journal/monitor application. The call journal created by this utility can be used for accounting purposes and for controlling the quality of service (every call record is stored together with information about the connection quality).
- **divasnmpx** SNMP extension agent providing interface and call statistics. Supports AgentX protocol and trap generation.
- Documentation (*.txt and *.html files) extracted to the /usr/doc/packages directory.

After you have installed your Dialogic® Diva® product, you might need to generate a license and activate it in the web interface to unlock the required functionality in the product.

You need to generate a license if you have installed one of the following products and purchased a license for one of the following functionalities:

Product	Functionality
Dialogic® Diva® System Release LIN	• Dialogic® Diva® softIP for SIP v2.2 software • Dialogic® Diva® SIPcontrol™ v1.6 software • Dialogic® Diva® softSS7 v1.5.2 software
Dialogic® Diva® Media Boards, except the Dialogic® Diva® BRI-2FX Media Board	G.729 speech compression
Dialogic® Diva® V-2 or V-4PRI Media Board	• Data modem support up to V.90 • AMR-NB voice codec • TDM fax support up to V.17 **Note:** If you have purchased a V.17 fax license, the number of simultaneous fax calls is limited to half the number of channels the Dialogic® Diva® Media Board offers. The Diva V-4PRI/E1/T1 Media Board offers 120/96 channels but enables only 60/48 simultaneous fax calls. The Diva V-2PRI/E1/T1 Media Board offers 60/48 channels but only 30/24 simultaneous fax calls. Furthermore, the simultaneous fax calls per port are reduced to half the number of channels the line offers, thus to 15 or 12 V.17 fax calls on one port. • TDM fax support up to V.34 **Note:** V.34 fax is only available if you have purchased 60/48 fax channels for a Diva V-2PRI/E1/T1 Media Board or 120/96 fax channels for a Diva V-4PRI/E1/T1 Media Board and bound the licenses to the Diva Media Board.

Device Unique ID (DUID)

The DUID binds the installed Dialogic® Diva® product to your PC (PC fingerprint).

To get the DUID:

1. Open the Dialogic® Diva® web interface and click **License Management**.
2. The DUIDs of the installed Diva products are displayed.
3. To use your DUID for the generating a license, select it, right-click it, and select **Copy**.
4. If you need to do web activation using another computer, open an editor, paste the DUID, and save the file.

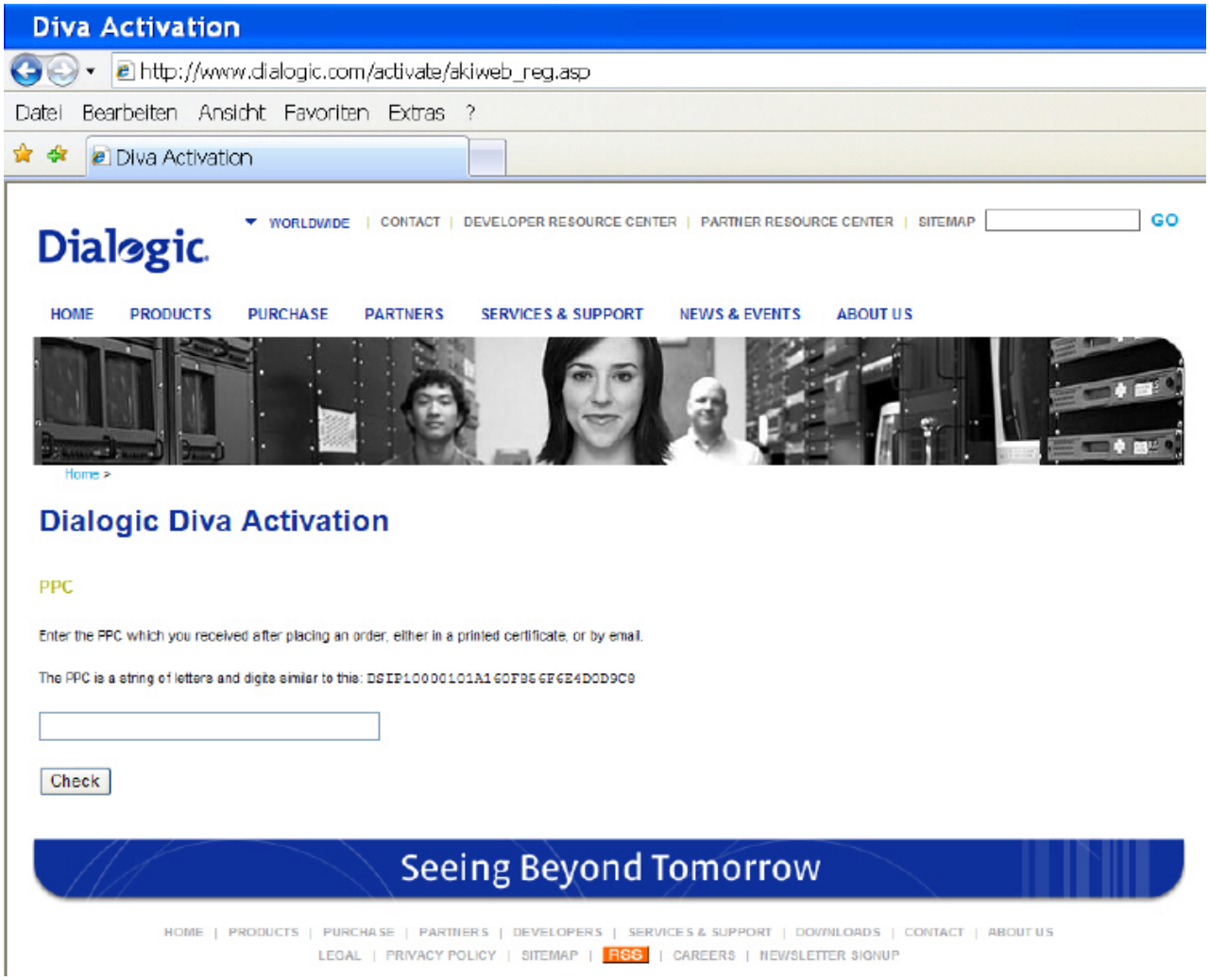
See ***To register your PPC and DUID*** on page 20 for information about generating a license.

Proof of Purchase Code (PPC)

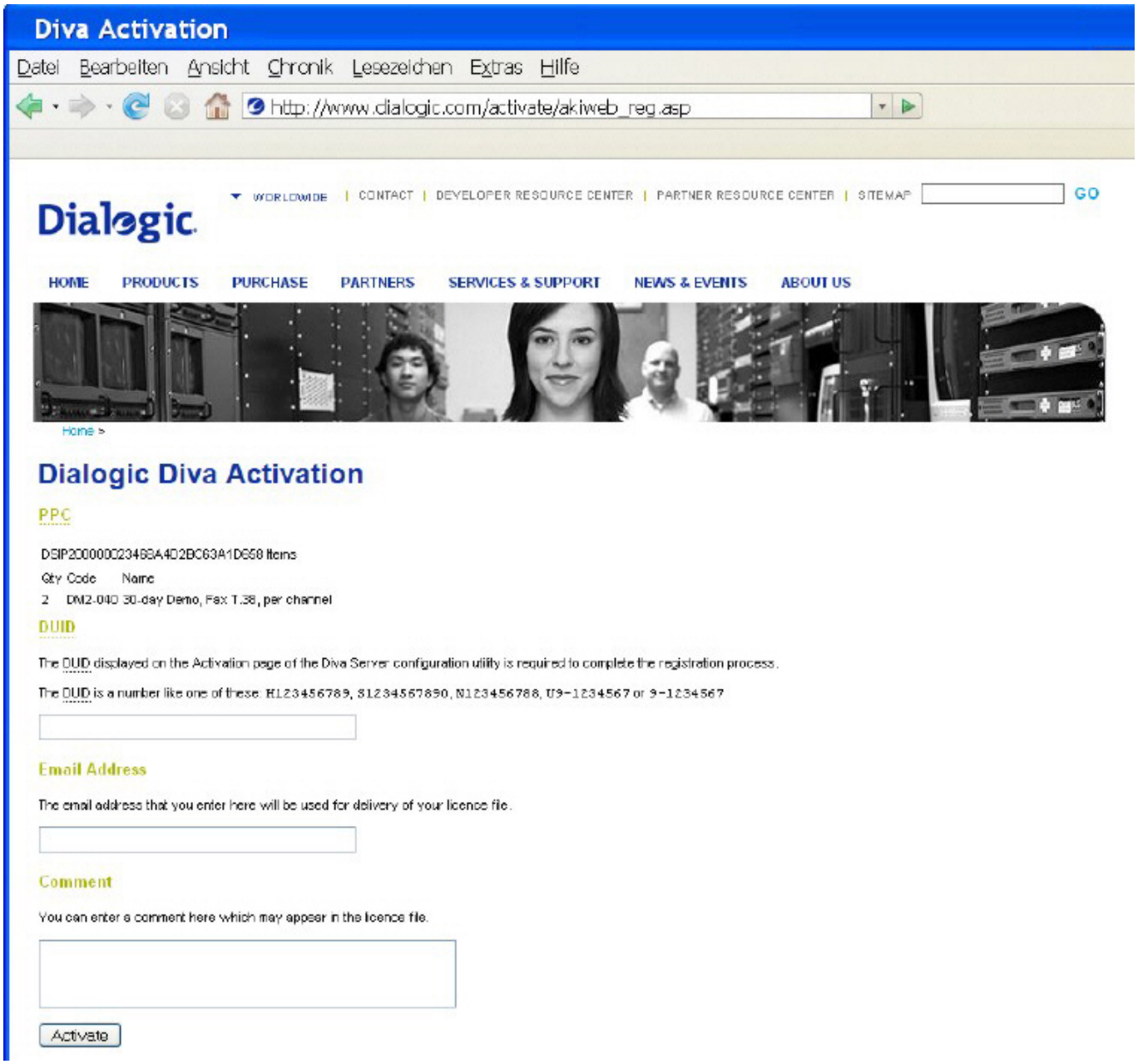
When you purchase the license, you will receive a PPC either in printed form or via email. By registering this PPC, you represent and warrant that you lawfully purchased the license.

To register your PPC and DUID

1. Open the following web site: http://www.dialogic.com/activate
2. Enter your PPC and click **Check**.


Diva Activation
http://www.dialogic.com/activate/akiweb_reg.asp
Datei Bearbeiten Ansicht Favoriten Extras ?
Diva Activation
Dialogic
WORLDWIDE | CONTACT | DEVELOPER RESOURCE CENTER | PARTNER RESOURCE CENTER | SITEMAP
GO
HOME PRODUCTS PURCHASE PARTNERS SERVICES & SUPPORT NEWS & EVENTS ABOUT US
Home >
Dialogic Diva Activation
PPC
Enter the PPC which you received after placing an order, either in a printed certificate, or by email.
The PPC is a string of letters and digits similar to this: DSIP10000101A160F9E6F6E4D0D9C0
Check
Seeing Beyond Tomorrow
HOME | PRODUCTS | PURCHASE | PARTNERS | DEVELOPERS | SERVICES & SUPPORT | DOWNLOADS | CONTACT | ABOUT US
LEGAL | PRIVACY POLICY | SITEMAP | RSS | CAREERS | NEWSLETTER SIGNUP

3. If your PPC is valid, the following web site will open:


Diva Activation
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
http://www.dialogic.com/activate/akiweb_reg.asp
Dialogic
WORLDWIDE | CONTACT | DEVELOPER RESOURCE CENTER | PARTNER RESOURCE CENTER | SITEMAP
GO
HOME PRODUCTS PURCHASE PARTNERS SERVICES & SUPPORT NEWS & EVENTS ABOUT US
Home >
Dialogic Diva Activation
PPC
DSIP20000023488A4D2BC63A1DS8 Items
Qty Code Name
2 DM2-040 30-day Demo, Fax T.38, per channel
DUID
The DUID displayed on the Activation page of the Diva Server configuration utility is required to complete the registration process.
The DUID is a number like one of these: R123456789, S1234567890, N123456788, U9-1234567 or 9-1234567
Email Address
The email address that you enter here will be used for delivery of your licence file.
Comment
You can enter a comment here which may appear in the licence file.
Activate

4. Paste your Device Unique ID (DUID) that you copied from the Diva web interface and enter your email address to which the license file should be sent.
5. Click Activate to generate the license file that will be sent to the email address you have entered.
6. Save the license file and activate it. For more information, see ***To activate the license*** on page 22.

To activate the license

The date set in the system settings of your computer must be correct. Otherwise, you cannot add your license file.

1. Open the Dialogic® Diva® web interface and click **License Management** on the lower left side of the interface.
2. Go to the product for which you want to activate the license and click **Browse** next to **Upload <product> license file**.
3. Go to the directory where you saved the license key file, select it, and click **Open**.
4. Click **Upload** to activate the license file.
5. The license file is shown for each product under **Installed license files**.

Now, the functionality is unlocked for the feature set you acquired with your license.

Configuring the Dialogic® Diva® System Release Software

The **Config** script (located in the `/usr/lib/opendiva/divas` directory) is a setup wizard that detects the installed Dialogic® Diva® Media Boards and additional applications.

The `setup wizard` generates the `divas_cfg.rc` file (located in the `/usr/lib/eicon/divas` directory) that is used to start the Diva Media Boards, interface drivers, and additional software at system startup or to start the components manually. You can use the script **/usr/lib/opendiva/divas/Start** to load and **/usr/lib/opendiva/divas/Stop** to unload the software manually.

The setup wizard creates the necessary device nodes in the /dev directory:

- /dev/capi20 is used to access the CAPI 2.0 interface
- /dev/ttyds01 ... /dev/ttyds<n> is used to access the Dialogic® Diva® TTY interface, where <n> is the sum of B-channels of the installed Diva Media Boards.

You can either use the **Config** script or the web-based Dialogic® Diva® Configuration Wizard to configure the settings for your Diva Media Boards. The following description of configuration options is based on the web-based Diva Configuration Wizard. It is structured as follows:

- Post installation settings: Steps to be performed immediately after the installation.
- System and Diva Media Board configuration: Configuration of the major parts of the product that depend on the type of your application and the switch type that the Diva board is using. Configuration of application and switch type-dependent parameters that allow you to increase the performance of the system or access switch-specific services. Configuration of number ranges, peers, protocol-specific settings and startup options.
- Control and monitoring: Control Diva Media Board configuration, status and performance data.
- Maintenance: Initiate trace process, create, view, and download trace files.

Post installation settings

The Dialogic® Diva® System Release software installs and configures the Dialogic® Diva® WEB Configuration Wizard (lightweight HTTP server, started via xinetd) that allows you to access and configure the Diva System Release software via an HTTP browser.

The installation procedure selects a free TCP port number between 10005 ... 10050, modifies your `/etc/services` and `xinetd` configuration files, and restarts the currently active `xinetd` application.

The installation procedure informs you about the selected port number in the initial "splash" screen that follows the installation procedure. If you miss this information, which can happen, for example, if you use a graphical RPM manager, you can obtain this information with the command: **grep "diva-cfg" /etc/services**.

If you do not want to use the Dialogic® Diva® WEB Configuration Wizard, you can disable it with the command: **cd /usr/lib/opendiva/divas && sh cfg_util.sh 4**. To re-activate the Diva WEB Configuration Wizard, use the command **cd /usr/lib/opendiva/divas && sh cfg_util.sh 3**.

To access the Diva WEB Configuration Wizard you need to edit the `/usr/lib/opendiva/divas/httpd/login/login` file and configure your password.

Note that the "login2 file must meet the following requirements, otherwise the password will be ignored:

- The file must be owned by root.
- Permissions must be 600 or 400.
- The password must be located in the first line of the file, contain printable characters only and consist of not less than 7 characters.

System and Dialogic® Diva® Media Board configuration

The system and Diva Media Board configuration is divided in two parts:

- ***System configuration*** on page 23 to configure the type of application, the system startup mode, and global parameters.
- ***Board configuration*** on page 24 to configure parameters of the installed Diva Media Boards in accordance with the information required by the service provider or the PBX to which the Diva Media Board is connected.

System configuration

Online help is available for any system configuration option. To open the online help for a specific parameter, click the parameter and a window with the help text pops up.

1. In the system configuration, select the applications and activate the interfaces that meet your requirements. For example, if you want to set up a fax polling server that is based on the TTY interface, select "TTY interface" and "fax/voice support for TTY".
2. Depending on the selected application scenario, you can set FAX CLASS 2 options like ECM, compression, etc. For further information, see the online help or ***Intelligent FAX CLASS 2 processing*** on page 54.

3. The system configuration also allows you to specify startup options for your Dialogic® Diva® Media Boards. If you plan to clone your system configuration on other computers, disable the verification of the serial numbers. If you want to view debug or trace messages that are issued during the Diva Media Board configuration, enable "Debug code for microcode load". For further information on these parameters, see the online help.
4. To write detailed call log records to the /var/log/divalog.../var/log/divalog.N file, activate the "call history". The call log records can be used for accounting and for generating different statistics.
5. Specify if the divasnmpx SNMP extension agent should be started during driver load.
6. Specify if the driver load should be forced even if the driver's kernel version does not completely match your Linux kernel version. Note that you cannot force a driver load if your Linux system uses kernel checksums.
7. Specify if the Dialogic® Diva® drivers should be loaded automatically on system startup.

At the end of the system configuration, the Dialogic® Diva® WEB Configuration Wizard will prompt you to restart the Diva drivers if necessary.[2] To restart the Diva drivers, go to **System control**, where you can stop and start the drivers.

Some of the changes, for example, "Start driver on system boot" or "Debug mode for microcode load" do not affect the state of the currently running drivers and change only the driver behavior at system or Dialogic® Diva® Media Board start. The Dialogic® Diva® WEB Configuration Wizard ignores changes of these parameters and does not prompt you to restart the Dialogic® Diva® Media Board drivers.

Board configuration

Context-specific online help is available for most configuration options. To open the online help for a specific parameter, click the parameter and a window with the help text pops up.

The **Board configuration** allows you to configure the Dialogic® Diva® Media Boards that are installed in your system as required by your service provider or by the PBX to which the Diva Media Boards are connected.

To start the configuration of a Diva Media Board, select its "board" icon in the Diva Media Board list. The basic configuration parameters are displayed.

1. Specify the D-channel protocol (switch type) as provided by your service provider.
2. Specify if you want to operate your board as terminal equipment (TE) or as network termination (NT). Normally, Diva Media Boards are operated as terminal equipment.
3. Specify whether you are using a direct dial in (DDI) interface. A direct dial in interface provides you with an ISDN line with a basic phone number that is able to accept any extension digits and to pass them to the ISDN applications. If you select **Yes**, also specify the direct dial in number length.

   Note: This option is not available for D-channel protocols. A better control of incoming called party numbers is available using the option **Call Routing**.
4. Specify the layer 1 framing type. The **National default** setting automatically sets the correct layer 1 framing type for the selected switch type. Change this setting only if you are using your Diva Media Board in a non-standard environment.
5. Specify the voice companding type that is used to transmit analog data on your line. The **National default** setting automatically sets the correct voice coding for the selected switch. You need to change this setting only if the voice coding required by your PBX does not correspond to the coding of the switch.

Depending on the installed board and the selected D-channel protocol, you might need to configure various advanced parameters. To do so, set **View extended configuration** to **Yes** and modify the advanced parameters as required. For further information on advanced parameters, see the online help.

After the board configuration is complete, the Dialogic® Diva® WEB Configuration Wizard stores the parameters list, generates a startup shell script and tries to update the modified parameters via the management interface. If updating via the management interface is not possible, for example, the board is not running or the configuration parameter is not supported by the management interface, the Diva WEB Configuration Wizard prompts you to restart the board.

You can use **Start hardware** option from the dropdown menu next to the Diva Media Board in the **Board configuration** to restart the selected board [3] or under **System configuration** you set **Start driver on system boot** to **Yes**, which allows for starting or restarting the Diva Media Boards at once.

Restarting the Dialogic® Diva® Media Board clears the active connections of this board.

Control and Monitoring

If you select the **Hardware status/management** icon, you will gain access to:

- Current status of the Dialogic® Diva® Media Board hardware, which allows you to view hardware-related settings and to control the state of the Diva Media Board hardware.
- Diva board startup log, which allows you to view the board's configuration as seen by the selected Diva Media Board.
- "XLOG" trace snapshot, which allows you to receive a small snapshot of the board traces for the trace ring buffer, located in the Diva Media Board memory.
- Line monitor, which allows you to view the status of active connections on the selected board and to clear these connections, if necessary.
- Management interface browser, which allows you to walk through the board management interface and view or modify management interface variables or execute management interface functions.
- Management interface browser, which allows you to walk through the Dialogic® Diva® TTY driver management interface and view or modify management interface variables or execute management interface functions (Port Manager).
- Management interface browser, which allows you to walk through the Dialogic® Diva® CAPI driver management interface and view or modify management interface variables or execute management interface functions.
- Report based on the information from the board management interface that provides an overview over the Diva Media Board's link status, link quality and over the call-related statistics.

Maintenance

The Dialogic® Diva® WEB Configuration Wizard provides access to the following maintenance functions:

- ***System environment*** on page 26 allows for viewing hardware-related settings of the host system.
- ***Trace/Debug*** on page 27 allows for creating debug and trace files of the Dialogic® Diva® Media Board or the system.
- ***Support/Troubleshooting*** on page 27 allows for capturing information required for the support request in case of installation problems.
- ***System messages*** on page 27 allows for viewing the latest system messages (dmesg).
- ***View trace file*** on page 28 allows for decoding, viewing, and filtering debug and trace files.
- ***View call history*** on page 28 allows for viewing the latest call history file.
- ***View statistics*** on page 28 allows for generating and viewing statistics, based on the call history files.

System environment

The system environment browser allows for viewing information about:

- Kernel version
- CPU(s)
- PCI bus configuration
- I/O memory configuration
- I/O port configuration
- DMA configuration
- Interrupt configuration
- APM configuration
- Loaded modules
- Installed devices
- Memory usage

Trace/Debug

The Dialogic® Diva® Trace Wizard allows for selecting various trace profiles and thus enables you to trace everything or to suppress unnecessary information in certain scenarios. Detailed information on the various trace profiles is given in the online help. To display the online help for a profile, click its name.

The Diva Trace Wizard also allows you to set the size of the trace ring buffer - a binary file where the trace information is stored - and to start the trace process in the background.

After the trace process is started, you can leave the Diva Trace Wizard or close your HTML browser without affecting the running trace process.

While the trace process is running (and after the trace process is stopped), you can decode, filter, and view the content of the trace ring buffer file with the trace file browser (**View trace file**).

To stop a running trace process, enter the Diva Trace Wizard again; the Diva Trace Wizard will remember that the trace process is still running, and stop it. After stopping the trace process, you can download the compressed binary trace file.

Support/Troubleshooting

If you should experience any problems after the installation of the Dialogic® Diva® System Release software, for example, no Dialogic® Diva® Media Boards can be detected, use the Dialogic® Diva® Support Wizard to capture and download in compressed form the information that is required to process your support request. Select one of the following options:

- Capture the necessary information about your system (kernel version, PCI-bus configuration, system configuration files).
- Capture the necessary information about your system (kernel version, PCI-bus configuration, system configuration files) and a binary image of the installed kernel and related modules. With this option, the Dialogic Customer Support can reproduce your environment if this should be necessary to process your support request. Select this option only if requested by the Dialogic Customer Support.

System messages

The system log viewer allows you to view the latest kernel messages. You can use this information to control the load and operation of Dialogic® Diva® drivers and to check your system for unexpected errors, driver failures, or exceptions ("Oops").

View trace file

The trace file browser allows for decoding, filtering, and browsing the trace file without downloading this file to your machine and without stopping the trace process.

The trace file viewer displays a list of the Dialogic® Diva® debug and trace sources information contained in the trace file and it allows you to select the sources of information that you want to view, decode, and display.

The trace viewer highlights messages in the trace information window by the following colors:

- Yellow - highlights messages related to initial call establishment
- Green - highlights messages related to the call establishment progress and completion
- Red - highlights messages related to the call disconnect procedure

To get detailed decoded information on trace and debug messages, click the "highlighted" links in the trace information window.

View call history

The call history (call journal/log) is stored as a sequence of files named `divalog`,`divalog.1`...`divalog.N`, where N is the integer number in the `/var/log` directory. The `divalog.N` file contains the oldest trace information while the `divalog` file contains the latest (current) information about the call activities.

You can use the call history viewer to decode the `divalog` file (call time, duration, type, speed) and view this information without downloading the call history file to your local machine.

To download call history files, click **Download**. You will receive a text file that displays the various components of the call history information separated by commas. The first line of the file contains the description of the components.

View statistics

The Dialogic® Diva® Statistics Viewer analyzes the call history files found in the `/var/log` directory and creates various statistics based on these files. The statistics show the total number of calls related to various periods of time, the ratio of incoming and outgoing calls, the ratio of call types, call duration charts, a peak board load chart, etc.

The statistic information is presented in a graphical format (jpeg) and can be used to analyze the system load and reliability.

If you want to create your own statistics, download the call history files in the call history viewer and apply your own spread-sheet application.

Loading the Dialogic® Diva® modules

During installation and configuration, the `divas_cfg.rc` script is automatically generated. This script is used to load protocol, CAPI, and TTY interfaces. On system startup, the Dialogic® Diva® Media Boards will be started by symbolic links named `S03DIVAS4LINUX` and `S06DIVAS4LINUX_NETWORK`. These links are created as part of the installation process and are located in the runlevels 2, 3, and 5 of the following directories (system and version dependent): `/etc/rc.d/` directories for Red Hat, in the `/sbin/init.d/` or `/etc/init.d/` directories for SuSE and in the `/etc/rcX.d/` directories for Debian and others.

- If you wish to remove these links, execute: **sh /usr/lib/opendiva/divas/cfg_util.sh 2**. If you wish to restore these links, execute: **sh /usr/lib/opendiva/divas/cfg_util.sh 1**).
- If you have changed the configuration or wish to restart or stop the Diva Media Boards without restarting your system, you can use the **/usr/lib/opendiva/divas/Stop** script to stop the Diva Media Board and unload the Dialogic® Diva® drivers.
- You can run the **/usr/lib/opendiva/divas/Start** script to load the Diva drivers and start the Diva Media Boards.
- If you wish to restart only one specific Diva Media Board, you can do so without unloading the drivers by executing the **/usr/lib/opendiva/divas/divas_cfg.rc restart <x>** command, where <x> is the logical board number.
- If boards support multiple interfaces (e.g., 4BRI), the board number should be the number of the master board. After the board was stopped, you can load and start it again without affecting other boards.
- If boards support multiple interfaces, the logical boards that belong to the same physical board are affected.
- An updated configuration can be written to the drivers by executing the **/usr/lib/opendiva/divas/divas_cfg.rc restart -1** command.

Dialogic® Diva® Media Board information

To interpret the Diva Media Board, driver, and trace data the following information is necessary:

- ***Physical and logical Dialogic® Diva® Media Board number*** on page 29
- ***"/proc" file system*** on page 30

Physical and logical Dialogic® Diva® Media Board number

Every Dialogic® Diva® Media Board that is installed in the system is a "physical" board. Every physical board contains one or more ISDN or analog interfaces. Each interface is represented in the system by a "logical" board. Example: Three physical Diva Media Boards are installed in the system: a Dialogic® Diva® BRI Media Board, a Dialogic® Diva® PRI Media Board, and a Dialogic® Diva® 4BRI Media Board. The Diva BRI Media Board and the Diva PRI Media Board add one logical board each. The Diva 4BRI Media Boards adds four logical boards to the system. If one physical board contains multiple logical boards, a continuous block of board numbers is allocated to these boards. The first logical Diva Media Board is the "master" board. This board is responsible for the hardware resources of the physical board and for loading, starting, and stopping the logical boards provided by the physical board. In the other aspects (functionality, configuration, selected protocol, debug buffers, and features) the logical boards are independent from the location of their physical boards: on different physical boards or on the same physical board.

"/proc" file system

After being started, the DIDD (divadidd.[k]o) driver creates the directory /proc/net/isdn/eicon for kernel 2.4.x and the directory /proc/net/eicon for kernel 2.5.x and higher in the proc file system. You can read the file `divadidd` in this directory (for example by executing **cat divadidd**) to get version information on the DIDD driver.

After being started, the XDI driver (`divas.[k]o`) creates the file `divas` in the /proc/net/[isdn/]eicon directory. You can read this file (for example by executing **cat divas**) to get version information on the XDI driver. A subdirectory named adapter<no> (<no> is the logical Dialogic® Diva® Media Board number) is created in the directory /proc/net/[isdn/]eicon for every logical Diva Media Board present in the system.

Each adapter`<no>` directory contains the following files:

info	You can read this file (**cat info**) to get information on the Diva Media Board: board name, serial number, number of channels supported by the board, hardware resources assigned to the board, board state. Possible board states are: ready (ready to download and start firmware or fpga), active (operating), trapped (firmware problem, core dump should be generated), unknown (hardware problem), and slave (slave board of a Diva Media Board that supports multiple logical boards)
group_optimization	You can read this file (**cat group_optimization**) to get the current state of this feature (on|off - 1|0). You can write "1" to this file to turn this feature on (**echo 1 > group_optimization**). You can write "0" to this file to turn this feature off (**echo 0 > group_optimization**). For further information on this feature, see the online help.
dynamic_l1_down	You can read this file (**cat dynamic_l1_down**) to get the current state of this feature (on|off - 1|0). You can write "1" to this file to turn this feature on (**echo 1 > dynamic_l1_down**). You can write "0" to this file to turn this feature off (**echo 0 > dynamic_l1_down**) for further information on this feature, see the online help.

Global fax configuration options

Global fax configuration options allow for overwriting parameters passed by the fax application to the Dialogic® Diva® Media Board and to control parameters running on the Diva Media Board's T.30 protocols. This provides a high level of flexibility, especially if the fax application does not provide the required parameters.

Fax configuration options

Option	Description
Fax speed limit	Allows to limit the transmission speed. Normally, you do not need to limit the fax speed because the Diva Media Board automatically negotiates the appropriate speed.
Disable fine resolution	Disables the transmission of fax messages with high resolution.
Disable Error Correction Mode (ECM)	Disables the transmission of fax messages using ECM (Error Correction Mode).
Use ECM frame length of 64 bytes	Forces usage of HDLC frames with a maximum length of 64 bytes if transmitting fax messages using ECM (Error Correction Mode).
Disable 2D fax document compression	Disables usage of 2D fax document compression. This option also disables the automatic (transparent to application) fax document compression provided by the Diva Media Board in order to increase the effective transfer speed of fax messages.
Disable T.6 fax document compression	Disables usage of T.6 fax document compression. This option also disables the automatic (transparent to application) fax document compression provided by the Diva Media Board in order to increase the effective transfer speed of fax messages.
Disable uncompressed T.6 fax document lines	In some cases, compression of a fax document line results in a line that is longer than the uncompressed original. The T.6 protocol allows you to reduce the fax transmission time by transmitting such lines without compression. This option disables the line compression optimization.
Refuse incoming polling requests	Disables incoming polling requests.
Hide "total pages" information in fax message	Hides the "total pages" information field in the fax message.
Hide "head line" information in fax message	Hides the "headline" information field in the fax messages.
Hide "page info" information in fax message	Hides the "page info" (i.e. message head) field in the fax messages.
Disable fallback to lower speed on failure	"Feature fallback" is used to prevent excessive resending of fax documents if working over poor quality lines. The Diva Media Board internally saves the fax ID of the last peer and the results of the fax transmission from this peer. If the results of the last fax transmission were negative and the application starts message re-transmission, the Diva Media Board will detect this and fallback to a lower transfer speed. This setting allows for disabling fallback.

Special configuration features

Dialogic® Diva® Media Boards provide numerous configuration options part of which are only used in special applications. These configuration options are not covered by the Dialogic® Diva® Configuration Wizard.

To get a full list of configuration options, execute **/usr/lib/opendiv/divas/divactrl load**.

You can apply special configuration options by modifying your Diva Media Board's startup script `/usr/lib/opendiva/divas/divas_cfg.rc`. In this case, you have to specify special configuration options as well as the standard options in the command line of the **/usr/lib/opendiva/divas/divactrl** board load utility.

Special configuration options can be changed during run time without restarting the board via the management interface, for example, with the **/usr/lib/opendiva/divas/divactrl mantool** management interface access utility.

Testing the Dialogic® Diva® Media Board functionality and connectivity

The following procedures will help you to verify if the Dialogic® Diva® Media Board and the service are working properly. After configuring and loading the drivers, it is recommended that you use one or more of the following methods for testing.

TTY test

This test allows you to test the Dialogic® Diva® Media Board and Dialogic® Diva® TTY interface functionality and link integrity using various bearer protocols supported by your Diva Media Board.

The **/usr/lib/opendiva/divas/tty_test** utility is located in the `/usr/lib/opendiva/divas` directory. On the server side, type: **/usr/lib/opendiva/divas/tty_test 1 s auto**. On the client side, type: **/usr/lib/opendiva/divas/tty_test 2 <ISDNnumber> x75** [4]. The transfer rate will appear in real time and be updated every time 64 Kbytes of data have been transferred.

Many other options, e.g., bearer protocol, packet size, rate adaptation, are available for the TTY test. Type **/usr/lib/opendiva/divas/tty_test** for a full list or refer to the section ***tty_test utility*** on page 95 in this document.

ACOPY2 file server

This tool allows you to test the Dialogic® Diva® Media Board and CAPI 2.0 interface functionality and link integrity using the X.75/T.70NL bearer protocol. The **acopy2** [5] utility is located in the `/usr/lib/opendiva/divas` directory.

Many other options, e.g., packet size, CPN, SubAddress, and commands are available. Type **/usr/lib/opendiva/divas/acopy2** for a full list.

On the server side, type: **/usr/lib/opendiva/divas/acopy2 -c<X> -serve /p2048**, where 2048 is the packet size for beneficial results and <X> is the CAPI board number that will receive the call.

On the client side, type: **/usr/lib/opendiva/divas/acopy2 -c<Y> - n<ISDNnumber>:file2 file1 /p2048**, where 2048 is the packet size for beneficial results and <Y> is the CAPI board number that will issue the call.

Testfax

This tool allows you to test Dialogic® Diva® Media Board and CAPI 2.0 interface functionality and link integrity using the Fax G3 bearer protocol.

The TESTFAX utility is located in the `/usr/lib/opendiva/divas` directory.

On the server side, type: **/usr/lib/opendiva/divas/testfax -serve -c<X>** [6], where <X> is the CAPI board number that will receive the call.

Many other options, e.g., packet size, transmission speed, ECM, SEP/SUB/PWD, compression, fax ID, headline, and commands are available. Call **/usr/lib/opendiva/divas/testfax** for a full list.

On the client side, type: **/usr/lib/opendiva/divas/testfax file.sff|file.txt <ISDNnumber> -c<Y>**, where <Y> is the CAPI board number that will issue the call.

TESTFAX will transmit the `file.txt` text file or the `file.sff` SFF file as fax document. The received document will be saved in the `rcv.sff` file.

Configuring the Dialogic® Diva® TTY ports

The `/dev/ttydsxx` ports must be configured by AT commands (parameters enclosed in square brackets are optional. Variables are enclosed in angle brackets).

AT-command set

The following commands are supported by the Dialogic® Diva® System Release software:

- ***AT commands*** see "Supported AT commands" on page 35
- ***AT\ commands*** see "Supported AT\ commands" on page 39
- ***AT% commands*** see "Supported AT% commands" on page 40
- ***AT# commands*** see "Supported AT# commands" on page 41
- ***AT& commands*** see "Supported AT& commands" on page 41
- ***AT$ commands*** see "Supported AT$ commands" on page 43
- ***AT+ commands*** see "Supported AT+ commands" on page 43
- ***Class Fax1 and class Fax2 AT commands*** see "Supported Class Fax1 and class Fax2 AT commands" on page 49
- ***AT+FTD. Set current time and date*** on page 50
- ***AT+FPH. Page header generation*** on page 50

Supported AT commands

AT command	Description	
AT A	ANSWER. Accepts an incoming call that has been indicated by a "RING". If the S0 register is set to zero, TTY indicates a RING until the call is answered by the AT A command or released.	
AT D[T|P]<number>	DIAL. Dials the given number. Dial tone (T) or dial pulse (P) are ignored. <number> can have the following format: <CalledPartyNumber>[| <Subaddress>][^56k][+i<y> | +p=btx] where <y> is the Diva-specific +I command (see below).	
AT E[0|1]	<n>	Echo mode. In echo mode, the commands sent to the modem are echoed back to the terminal.
	0	Echo mode OFF. In command mode, the modem does not reflect the data that it has received from the application back to the application.
	1	Echo mode ON. In command mode, the modem reflects the data that it has received from the application back to the application.

AT I[<n>]	INFO. Returns the modem identification string. <n> : integer ranging from 0 to 9	
AT H[0]	HANGUP. Disconnects the line.	
AT O[1]	ONLINE. Switches the modem from command mode to data mode.	
AT Q[<n>]	<n>	Modem response mode
	0	Returns result codes (default)
	1	Quiet mode. In quiet mode the modem driver does not return result codes for the commands.
AT V[<n>]	<n>	Modem response (result code) format
	0	Numeric result codes.
	1	Plain text result codes (verbal mode, default).
AT L<n>	Command accepted for compatibility reasons.	
AT N<n>	Command accepted for compatibility reasons.	
AT M<n>	Command accepted for compatibility reasons.	
AT Y<n>	Command accepted for compatibility reasons.	
AT X<n>	<n>	Result code reporting option
	0	Enables minimum information only (plain CONNECT in case of successful connection establishment, NO CARRIER in case of dialing/answer error).
	4	Enables full information (the result codes are reported, default).
AT Z[<n>]	Soft reset. Drops the connection if the modem is in ESCAPE mode. Resets the modem and restores the selected predefined modem configuration profile <n>. See ***Supported TTY profiles*** on page 52 for more information. See AT&F below for the list of predefined modem configuration profiles.	
AT S<r>=?	Displays the value of the selected S-register <r>.	
AT S0=<n>	<n>	Description
	0	Disables auto answer. Incoming calls are answered with an ALERT message and indicated by RING messages (every 4 sec). The user can investigate the call parameters, select the appropriate profile or settings and accept the call by the AT A command. The user can issue the AT H command to reject the incoming call.
	1 ... 254	Enables auto answer. Incoming calls are indicated by a RING and accepted automatically.
	255	Ignores the incoming calls (default).

ATS2=<n>	<n> (0 ... 255)	Description	
	127	Disables the escape sequence process, i.e. no escape character is recognized.	
	43	The default value of the ESCAPE character ("+").	
ATS7=<n>	Default value is set to zero (e.g., modem will use protocol-specific default value). Modem mode: time to wait for carrier. Sets the time in seconds that the modem will wait for a carrier before hanging up. <n> is a range from 0 to 255 seconds. Fax mode: time to wait for connect. Sets the time in seconds that fax will wait for connection before hanging up. Suggested value is 200 seconds. Values less than 10 seconds are ignored. The carrier waiting time starts after the connection was established and is set to 60 seconds.		
ATS9=<n>	Carrier Detect Response Time. Sets the time in tenths of a second that a carrier must be present before the modem considers it valid. <n> is a range from 0 to 255 tenths of a second. This register is only implemented for compatibility reasons. Writing to this register does not affect the Carrier Detect Response time.		
ATS10=<n>	Delay between carrier loss and hang up. Sets the time in tenths of a second that the modem waits before hanging up after a loss of carrier. <n> is a range from 0 ... 255 tenths of a second.		
ATS27=<bitmask>	**Bit**	**Value**	**Result**
	0	1	Reserved
	1	2	Reserved
	2	4	Reserved
	3	8	Disables 2100 Hz answer tone
	4	16	Reserved
	5	32	Reserved
	6	64	Reserved
	7	128	Reserved
ATS51=<bitmask>	**Bit**	**Value**	**Result**
	0	1	Disables error correction for 1200 bps connections
	1	2	Disables error correction for V.22bis connections
	2	4	Disables error correction for V.32bis connections
	3	8	Reserved

	4	16	Reserved
	5	32	Reserved
	6	64	Reserved
	7	128	Reserved
ATS91=<bitmask>	**Bit**	**Value**	**Result**
	0	1	Use reverse SDLC establishment (SNRM sent by answerer and not by caller). Mandatory for POS.
	1	2	Poll on each SDLC frame. Required by some POS terminals.
ATS92=<n>	SDLC Address A (default 0x30)		
ATS128	S-register 128 is a read-only register. Reading this register allows to retrieve information on the current (last) incoming call. It returns a message in the following format: `;<calling party number>;<destination_address>`. If calling party or destination sub-addresses are present, they are separated by a slash "/" from the called party number or the destination address. For example, the calling party number 800, calling party sub-address 900, destination address 400, destination sub-address 500 are presented as: `;800/900;400/500`.		
ATS172=<bitmask>	**Bit**	**Value**	**Result**
	0	1	Enable transmission and reception of empty frames.
	1	2	Enable "multimoding", i.e. a trailing byte (modulation tag) in every frame specifies which modulation has to be used to send this frame or at which modulation it was received. Valid modulation tags are 0x27 for V.23 HDX off hook and 0x28 for V.23 HDX on hook.
	2	4	Shield empty frames. This mode enables a tty application to send and receive empty frames. Since a frame with a length of 1 byte is invalid in the V.23 SMS and V.23 Caller ID protocol, it is used to carry the information that an empty frame occurred and which modulation was detected. The data byte in a real 1 byte frame is replaced by a unique value 0xff. A single byte frame 0x27 indicates or issues an empty frame in V.23 HDX off hook. A single byte frame 0x28 indicates or issues an empty frame in V.23 HDX on hook.
ATS253=<n>	<n> (0 ... 127)		Description
	Set		Write allows to set coded in accordance with Q.931 cause value to be used to disconnect this call (for example by ATH/ATZ commands or by DTR drop operation). The Dialogic® Diva® Media Board provides conversion between used national dependent values/in band procedures and Q.931.
	Read		Read after disconnect provides coded in accordance with Q.931 value of disconnect cause. The Dialogic® Diva® Media Board provides conversion between used national dependent values/in band procedures and Q.931.

ATS254=<bitmask>	**Bit**	**Value**	**Result**
	0	1	Allows to reject incoming call using ATH, ATZ commands or using DTR drop procedure.
	1	2	Activate TIES (Time Independent Escape Sequence). The TIES procedure switches to command mode if "+++AT<CR>" (where <CR> represents hex digit 0x0D) sequence is detected in the data stream after a 20 ms pause and is followed by a 40 ms pause.
ATS1001=<number>	Second origination address. This number is placed as the second origination address.		
ATS1002=<number>	Specifies the numbering plan identifier for the second origination address. Number should be in the range 0...255. If number is set to 128 or larger then octet 3a (presentation and screening indicator) is not used.		
ATS1003=<number>	Specifies the presentation (bits [7:6] in octet 3a of origination address) and screening (bits [2:1] in octet 3a of origination address) for the second origination address. Number should be in the range 0...127.		

Supported AT\ commands

AT command	**Description**	
AT \V[<n>]	<n>	CONNECT message format
	0	Plain CONNECT message without any connection parameters.
	1	Full CONNECT message including connection parameters (modulation, compression, transmit/receive rate).
	2	Full CONNECT message in multi-line format: CONNECT, TX/RX, CARRIER, PROTOCOL, COMPRESSION.
AT \T[0...65535]	Inactivity timeout (s). TTY releases the connection if there was no data traffic on the interface for the time interval specified here.	
AT \D[<n>]	Debug level. Reserved for use by Dialogic Corporation.	
AT \N[<n>]	<n>	Error correction control
	0|1	Turn off error correction, error correction detection, and data compression (i.e. connect in transparent mode only).
	2	Disable V.42 error correction and V.42 error correction detection (i.e. MNP only). In case of failure, connect in transparent mode.
	3	Try to establish error correction; try to detect error correction (any supported). In case of failure, connect in transparent mode.
	4	Force V.42 error correction. Disconnect in case of failure.

	5	Force MNP error correction. Disconnect in case of failure.
	6	Force V.42 or MNP error correction. Disconnect in case of failure.
	7	Try to establish V.42 error correction; try to detect V.42 error correction. In case of failure, connect in transparent mode.
	8	Try to establish MNP error correction; try to detect MNP error correction. In case of failure, connect in transparent mode.
	10	Force SDLC error correction. Disconnect in case of failure.
	11	Try to establish SDLC error correction. In case of failure, connect in transparent mode.
	12	Try to establish SDLC or MNP error correction. In case of failure, connect in transparent mode.
	13	Try to establish SDLC or V.42 error correction. In case of failure, connect in transparent mode.
	14	Try to establish SDLC or V.42/MNP error correction. In case of failure, connect in transparent mode.

Supported AT% commands

AT command	**Description**	
AT %C[<n>]	<n>	Data compression control
	0	Turn data compression off
	1	Turn data compression on

Supported AT# commands

AT command	Description	
AT #CID=?	Displays CID (Caller ID) setting. The short form of this command is "CID?".	
AT #CID=<n>	<n>	Sets CID mode. The TTY indicates the origination (CID) and destination (DAD) number in the RING and/or CONNECT message. This enables a server application for example to forward incoming calls directly to their destination. [a]
	0	No CID indication
	1	CID indication in RING message [a]
	2	CID indication in CONNECT message [b]
	3	CID indication in RING and in CONNECT messages
	5	CID and DAD (Destination Address [a]) indication in RING message [c]
	6	CID and DAD [a] indication in CONNECT message [d]
	7	CID and DAD [a] indication in RING and in CONNECT messages
	9	Use an **mgetty** friendly format for CID indication in RING message [e]
	15	Use an **mgetty** friendly format for CID and DAD [a] indication in RING message [f]

Notes:
[a] CID (Calling Party Number) is indicated as: RING CID: <number>
[b] CID (Calling Party Number) is indicated as: CONNECT ... CID: <number>
[c] Indicated as: RING CID: <number> DAD: <number>
[d] Indicated as: CONNECT ... CID: <number> DAD: <number>
[e] Indicated as: RING;<number>
[f] Indicated as: RING;<number>;<number>

Supported AT& commands

AT command	Description	
AT &C[<n>]	Accepted for compatibility reasons. <n> : any integer	
AT &G[<n>]	<n>	Guard tone options
	0	Turns guard tone off (default).
	1	Turns 550 Hz guard tone on.

<table>
<tr><td></td><td>2</td><td>Turns 1800 Hz guard tone on.</td></tr>
<tr><td>AT &D[<n>]</td><td colspan="2">Data Terminal Ready (DTR) options. <n> ranges from 0 to 3. See AT&Q command below.</td></tr>
<tr><td>AT &Q[<n>]</td><td colspan="2">Communication options. <n> ranges from 0 to 3. Data Terminal Ready (DTR) options and Communication (COM) options determine the behavior of the virtual modem when DTR switches from ON to OFF in accordance with the following table:
<table>
<tr><td>&Q</td><td>&D0</td><td>&D1</td><td>&D2</td><td>&D3</td></tr>
<tr><td>&Q0</td><td>N [a]</td><td>B</td><td>C</td><td>D</td></tr>
<tr><td>&Q1</td><td>A [b]</td><td>B [c]</td><td>C [d]</td><td>D [e]</td></tr>
<tr><td>&Q2</td><td>C</td><td>C</td><td>C</td><td>D</td></tr>
<tr><td>&Q3</td><td>C</td><td>C</td><td>C</td><td>D</td></tr>
</table></td></tr>
<tr><td>AT &K<n></td><td><n></td><td>Terminal flow control options. Defines the flow control mechanism.</td></tr>
<tr><td></td><td>0</td><td>Disables flow control.</td></tr>
<tr><td></td><td>1</td><td>Enables RTS/CTS local + remote flow control (obsolete).</td></tr>
<tr><td></td><td>2</td><td>Enables XON/XOFF flow control (obsolete).</td></tr>
<tr><td></td><td>3</td><td>Enables RTS/CTS local + remote flow control.</td></tr>
<tr><td></td><td>4</td><td>Enables XON/XOFF flow control.</td></tr>
<tr><td></td><td>5</td><td>Enables transparent XON/XOFF flow control.</td></tr>
<tr><td></td><td>6</td><td>Enables both XON/XOFF and RTS/CTS flow control (voice).</td></tr>
<tr><td>AT &V</td><td colspan="2">Displays the current configuration, the last number that has been dialed (last DIAL to), and the calling party number of the last incoming call (last RING from).</td></tr>
<tr><td>AT &V1</td><td colspan="2">Displays current settings and settings of the available profiles.</td></tr>
<tr><td>AT &F[<n>]</td><td colspan="2">Resets the modem and restores the selected predefined modem configuration profile. AT&F sets factory defaults for current profile. See Supported TTY profiles on page 52 for details.</td></tr>
</table>

Notes:
[a] No action is taken, the DTR drop is ignored.
[b] If the modem is online, it hangs up and responds with OK.
[c] If the modem is online, it switches to command mode (as if an ESCAPE sequence was detected) and sends OK.
[d] If the modem is online, it hangs up and responds with OK.
[e] If the modem is online, it hangs up and the current profile defaults are restored.

Supported AT$ commands

AT command	Description
AT $F<number>	Controls Dialogic® Diva® FastSetup. 0 - Normal connection (default), 1 - FastSetup without answer/calling tone, 3 - FastSetup with answer tone. The AT+MS command can be used to control the allowed FastSetup modulations: AT+MS=V90a,1 - v.22 and v.22bis FastSetup, AT+MS=v22 - v.22 FastSetup, AT+MS=v22b,0 - v.22bis FastSetup.

Supported AT+ commands

AT command [a] [b]	**Description**	
AT +iA<number>	Accepted address. Incoming calls are only accepted if the called party number equals the phone number configured here. Addresses are compared backwards. So, if you set the accepted address to 12, the called party numbers that end with 12, e.g., 12, 812, 384012, match the configured address. [c]	
AT +iO<number>	Origination address. This number is placed as the origination address. [c]	
AT +iB<n>	<n>	B-channel data adaptation rate [d]
	2	1200 bps
	3	2400 bps
	4	4800 bps
	5	9600 bps
	6	19200 bps
	7	38400 bps
	8	48000 bps
	9	56000 bps
AT +iC[<n>]	<n>	Determines whether the modem stays in command mode after call setup.
	0	Stays in command mode.
	1	Switches to data mode.
AT +iD<n>	<n>	Delay for AT-command response (ms).
	0	AT-command response is sent immediately.

	1 ... 255	AT-command response is delayed.	
AT +iF<n>	<n>	RNA Framing. [e]	
	0	No framing check (pass data transparently).	
	1	Force synchronous conversation (PPP).	
	2	Force asynchronous conversation (PPP).	
	3	Force synchronous conversation (RAS).	
	4	Force asynchronous conversation (RAS).	
	5	Detects required conversation by analyzing incoming data packets.	
AT +iG<bitmask>	**Bit**	**Value**	RNA patches. Controls the behavior of the ASYNC/SYNC PPP conversion module. See ***ASYNC/SYNC conversion module*** on page 54 for details.
	1	1	Reserved, should be zero.
	2	2	Reserved, should be zero.
	3	4	Reserved, should be zero.
	4	8	Pass IPCP (default is track).
	5	16	Force patch of IPCP.
	6	32	Keep RX ACCM (default is add).
	7	64	Keep TX ACCM (default is delete).
	8	128	Pass LCP (default is track).
AT +iL<n>	Maximum data frame length. <n> should be in the range of 0 ... 2048. 0 defaults to the maximum frame length supported by the Dialogic® Diva® Media Board.		
AT +iM<n>	<n>	Working mode	
	1	Normal operation mode. TTY does not try to preserve the protocol data unit boundaries (streaming). This mode fully emulates the behavior of a "classic" modem or terminal adapter connected via a serial interface.	
	2	Fax mode. TTY switches to this mode as soon as a Fax CLASS 1 or Fax CLASS 2 command is detected.	
	3	Voice mode (bit-transparent access to B-channel data).	

	4	RNA mode. TTY operates in framing mode, investigates protocol data units, and provides ASYNC/SYNC conversion if necessary.
	5	BTX over ISDN mode.
	6	Frame mode. The TTY preserves the frame boundaries of the ISDN data frames. Note that the Linux TTY interface will stream the data again.
AT +iN<Format>	Format	Numbering plan for destination/origination address and presentation/screening indicators for origination address.
	Number1[/Number2[/Number3[/Number4]]]	Specifies the numbering plan identifier for the destination address (Number1), origination address (Number2), presentation indicator - bits [7:6] in octet 3a of origination address (Number3) and screening indicator - bits [2:1] in octet 3a of origination address (Number4). Number1 and Number2 should be in the range 0...127. Number3 and Number4 should be in the range 0...3.
AT +iP<n>	<n>	Specifies the protocol stack used to transfer bearer data.
	1	L1 - HDLC, L2 - X.75SLP and V.42bis data compression autodetection in case of incoming connection, L3 - transparent
	2	L1 - V.110 synchronous mode, L2 and L3 - transparent
	3	L1 - V.110 asynchronous mode, L2 and L3 - transparent
	4	L1 - analog modem (synchronous mode), L2 - V.42+V.42bis autodetect, L3 - transparent
	5	L1 - analog modem with full negotiation, L2 - V.42+V.42bis autodetect, L3 - transparent
	6	L1 - HDLC, L2 - V.120, L3 - TA
	7	L1 - Fax, L2 - transparent, L3 - T.30 with ECM, T.6, MR, MMR, polling
	8	L1, L2, and L3 - transparent
	9	L1 - HDLC, L2, and L3 - transparent
	10	L1 - HDLC, L2 - X.75SLP, L3 - BTX
	11	external device 0
	12	L1 - HDLC, L2 - X.75SLP and data compression autodetection in accordance with V.42bis, L3 - transparent

AT +iS<Format>	Format	Service Indicator/Additional Service Indicator
	Number	Sets the Service Indicator to the provided value. The Additional Service Indicator is set to zero. The number should be in the range 1 ... 7.
	Number1/Number2	Number 1: Service Indicator. It should be in the range of 1 ... 7. Number 2: Additional Service Indicator. It should be in the range of 0 ... 255. [f]
At +iT<n>	ISDN trace options. Reserved for use by Dialogic. <n> ranges from 0 to 255.	
AT +iH[<n>]	<n>	Erases/sets slow application workarounds.
	0	Erases workarounds. Equivalent to AT command: AT+IW=0+IX=0+IY=0+iZ0
	1	Sets workarounds. Equivalent to AT command: AT+IW=1+IX=81+IY=8+iZ80
AT +iW<n>	Defers receive notifications to <n> bytes/millisecond. <n> should be in the range of 0 ... 64000.	
AT +iX<n>	Respects read block size and defers receive notifications. <n> should be in the range of 0 ... 64000.	
AT +iY<n>	Defers transmission to <n> bytes/millisecond. <n> should be in the range of 0 ... 8.	
AT +iZ<n>	Splits large frames into <n> byte segments. <n> should be in the range of 0 ... 2048.	
AT +iU=<BC>|<BC/LLC>	Sometimes the Service Indicator and Additional Service Indicator are not flexible enough to indicate the necessary information in bearer capabilities (BC) and low-layer compatibility (LLC) that the user wants to provide for an outgoing call. In this case, the user can set these values directly. For example, to indicate a V.110 call with 38400 bps and the appropriate flow control option, the user can enter the command: AT+IU=<8890214d00bb> to specify the BC value. The provided BC and LLC values are used without any verification (except max. length of information element) to create the SETUP message sent over the D-channel. This allows the use of proprietary BC/LLC values not yet covered by standards. See ***Call parameter (BC/LLC) selection*** on page 57 for details.	
AT +iI	Reserved.	
AT +iE=<Mode>	Mode	Global TTY mode. See ***Incoming RAS call type autodetection*** on page 53 for details.
	AT&F16+IE=piafs 32k	China 32K PIAFS link
	AT&F17+IE=piafs 64k	China 64K PIAFS link

	AT&F18+IE=piafs	China variable speed PIAFS link
	AT+IE=none	Resets the tty interfaces to "default" mode (i.e. signaling information will be used to determine the call type)
AT +iQ=<binding>	String	Binding. See ***TTY "channel pool" mode*** on page 58 for details.
	oX	Bind TTY to board X for outgoing calls
	iX	Bind TTY to board X for incoming calls
	aX	Bind TTY to board X for the calls
	o0	Erase TTY binding for outgoing calls
	i0	Erase TTY binding for incoming calls
	a0	Erase TTY bindings for incoming and outgoing calls
	?	Display current bindings
AT +iK=<binding>	String	Binding. See ***TTY "channel pool" mode*** on page 58 for details.
	oY	Bind TTY to line Y for outgoing calls
	iY	Bind TTY to line Y for incoming calls
	aY	Bind TTY to line Y for the calls
	o0	Erase TTY binding for outgoing calls
	i0	Erase TTY binding for incoming calls
	a0	Erase TTY bindings for incoming and outgoing calls
	?	Display current bindings
	Note: This command must be used in conjunction with the AT+iQ command to first set the controller number that the tty interface is bound to	

AT +MF=<data bits><parity>,<top bits>	Data bits: 8,7,5. Parity: N (none), O (odd), E (even), S (space), M (mark). Stop bits: 1, 2. The transmission rate is derived from the currently selected Rx/Tx transmission speed (+MS command). Example: AT+MF=8,N,1 - select 8 data bits, no parity and one stop bit.
AT +MF?	Returns currently selected framing.
AT +MF=?	Returns list of supported parameters.
AT +MS?	Modulation Selection Query. The response to the query has the following format: AT +MS: <mod>,<auto>,<min>,<max>,<min_rx>,<max_rx>.
AT +MS=[<mod>][,[<auto>][,[<min>][,[<max>][,[<min_rx>][,[<max_rx>]]]]]]	Modulation Selection Set. Modulation: B103 (300 bps), B212A (1200 bps), V21 (300 bps), V22 (1200 bps), V22B (1200 - 2400 bps), V22F (1200 bps Dialogic® Diva® Fast Setup), V22BF (1200 - 2400 bps Diva Fast Setup), V23C (Tx:75 bps/Rx:1200 bps outgoing call, Tx:1200 bps/Rx:75 bps incoming call), V23HDX, V23HDXON (1200 bps half duplex for SMS over PSTN, off/on hook standard), V32 (4800 - 9600 bps), V32B, (4800 - 14400 bps), V34 (2400 - 33600 bps), V90 (28000 - 56000 bps download client <- server, 28000 - 32000 bps upload client -> server), V90a (28000 - 56000 bps upload client -> server, 28000 - 32000 bps download client <- server). Auto: 0 - use only the specified modulation, 1 - try other modulations with lower data rates if the specified modulation cannot be used. min: Minimum transmit data rate. max: Maximum transmit data rate. min_rx: Minimum receive data rate. max_rx: Maximum receive data rate. Only V90 modulation has different transmit/receive rates. Rate = 0 means no minimum or maximum limitation. Valid Rate Values (in bps): 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28000, 28800, 29333, 30667, 31200, 32000, 33600, 33400, 34667, 36000, 37333, 38000, 38667, 40000, 41333, 42000, 42667, 44000, 45333, 46000, 46667, 48000, 49333, 50000, 50667, 52000, 53333, 54000, 54667, 56000, 0

Notes:
[a] "AT+" commands are Dialogic® Diva®-specific commands which may be used either as part of a normal AT command or as part of a called party number.
[b] If you use this AT command in sequence (in one line) with other AT commands, it should either be the last command or it should be followed by a semi-colon ";". For example: the AT-command sequence AT&F14, AT#CID=7, ATS0=1, AT+IA12 can be written as: AT&F14#CID=7S0=1+IA12 or AT&F14+IA12;#CID=7S0=1
[c] If a subaddress (SUB) needs to be entered, it must be separated from the rest of the number by a vertical character [|] (also called the pipe symbol).
[d] If supported by used bearer protocol (for example V.110).
[e] Determines if the ASYNC/SYNC conversion module is inserted on top of OSI Layer 3 and which mode this module assumes. See ***ASYNC/SYNC conversion module*** on page 54 for details.
[f] Commonly used values are: 1/1 - ISDN voice call 3.1 kHz, 1/2 - Analog voice call, 1/3 - ISDN voice call 7 kHz, 2/1 - Fax group 2, 2/2 - Fax group 3, 2/3 - Data over modem connection, 2/4 - BTX over modem connection, 7/0 - 64 kbps Data, 7/170 - 56 kbps Data, 7/197 - V.110 rate ***adaptation. See Call parameter (B***C/LLC) selection on page 57 for details.

Supported Class Fax1 and class Fax2 AT commands

The following list is an excerpt of the complete list.

Command	Description
AT +FCLASS?	Queries the configured modem class.
AT +FCLASS=?	Displays the supported modem classes.
AT +FCLASS=<n>	Configures the modem for modem class <n>. 0 - Data mode, 1 - EIA class 1, 2 - EIA class 2
AT +FMFR?	Returns the name of the modem manufacturer.
AT +FMDL?	Returns the name of the modem model.
AT +FREV?	Returns the product version.
AT +FLPL=<n>	Control class 2 polling capability. 0 - Normal operation. 1 - Document available for polling.
AT +FTD	See ***AT+FTD. Set current time and date*** on page 50.
AT +FPH	See ***AT+FPH. Page header generation*** on page 50.

AT+FTD. Set current time and date

The AT+FTD command is used to set the current date and time. The current time and date should be set before each fax transmit session. The syntax of the command is:
AT+FTD=year,month,hour,minute,second,zone,dtsdelta

Parameter	Description
year	The current year. Range: 1970 to 65535
month	The current month number. Range: 1 to 12. January is 1.
day	The current day of the month. Range: 1 to 31.
hour	The current hour. Range: 0 to 23.
minute	The current minute. Range 0 to 59.
second	The current second. Range 0 to 59.
zone	Reserved. Should be set to zero.
dtsdelta	Reserved. Should be set to zero.

AT+FPH. Page header generation

The AT+FPH command is used to enable automatic generation of a Fax page header. There are three allowable formats for the syntax of this command:

1. AT+FPH=mode,"left"
2. AT+FPH=mode,"left'middle'right"
3. AT+FPH=mode,"left'right"

AT+FPH command parameters

Parameter	Description
mode	Reserved. Should be set to 1.
string	The string defines the page header itself. Only ASCII printable characters are allowed in the string (0x20 thru 0x7e). Escape sequences that are introduced with the percent (%) character are allowed. The string can be partitioned into one, two, or three parts by using single quote characters (') in the command expression.

An escape sequence is a % followed by an optional width, which may include a leading left-justification signifier, and then by the escape character itself. It is of the form %[numbers][-]character. The dash (-) denotes left justification. When the dash is absent, right justification is used. If the width specification starts with a zero and the escape sequence is expanded, the value will be left-padded with zeroes. Otherwise, it will be left-padded with spaces.

Recognized escape sequences

Sequence	Description
%d (or %D)	The day of the month as a decimal number (range 01 to 31).
%h (or %H)	The hour as a decimal number using a 24-hour clock (range 00 to 23).
%i (or %I)	The hour as a decimal number using a 12-hour clock (range 01 to 12).
%m	The month as a decimal number (range 01 to 12).
%M	The minute as a decimal number (two digits).
%p	Either "am" or "pm" according to the given time value or the corresponding strings.
%P	The current page number of the fax being sent, as computed by the padding. Please note that page number is printed at the right upper corner of the page and not at the location where %P tag was found.
%r (or %R)	The ID of the remote fax machine. Leading and trailing blanks are stripped. A printf-style field width specifier such as %20r or %-20r can be used to print this in a fixed width field.
%s (or %S)	The second as a decimal number (two digits).
%t (or %T)	The ID of the transmitting fax machine. Leading and trailing blanks are stripped. A printf-style field width specifier such as %20t or %-20t can be used to print this in a fixed width field.
%y	The year as a decimal number without the century.
%Y	The year as a decimal number including the century.
%C	C - unrecognized format character. Printed as C.

Supported TTY profiles

You can use the AT&F[<profile>] and ATZ[<profile>] commands to select a TTY profile.

Supported TTY profiles

Profile	Description
14	Autodetection of B-channel protocol. See ***Incoming RAS call type autodetection*** on page 53 for details.
1	X.75/Transparent/Transparent protocol stack. Data compression in accordance with V.42bis is detected automatically for incoming calls.
2	V.110 synchronous mode.
3	V.110 asynchronous mode.
4	Synchronous modem with V.42/V.42bis.
5	Asynchronous modem (up to V.90) with full negotiation and V.42/V.42bis/MNP.
6	V.120, 64 kbps, V.42bis compression auto-detection for incoming connections
7	V.120, 56 kbps, V.42bis compression auto-detection for incoming connections
8	Bit-transparent access to B-channel data [a]
9	HDLC/Transparent/Transparent protocol stack that is widely used for PPP connections [b].
10	Same as profile 9, but with 56000 bps
11	BTX
12	BTX
15	X.75 with data compression in accordance with V.42bis. This profile should be used for outgoing calls if you wish to use data compression in accordance with V.42bis. If the opposite side does not support data compression, the connection will be established without data compression.
16	PIAFS 1.0 32 kbps [c]
17	PIAFS 2.0 64 kbps [c]
18	PIAFS 2.1 32/64 kbps [c]

Notes:
[a] By default, this profile does not switch to data mode after the connection was established.
[b] This profile switches to numeric mode (ATV0) and "echo off" (ATE0) by default.
[c] You can use the AT+iE command to activate the CHINA PIAFS protocol extension.

Incoming RAS call type autodetection

For incoming calls, you can use autodetection of the B-channel protocol. The call autodetection procedure detects the call type, uses the right framing and ***ASYNC/SYNC conversion module*** on page 54 if necessary in order to present the data to the RAS PPP application like it comes from an analog modem (ASYNC PPP framing). This allows you to use a standard RAS application that serves the incoming calls on the same port, independent from the call type.

In autodetection mode, the TTY proceeds as follows:

1. It analyzes the BC/LLC if present. If enough information is given in BC/LLC, the appropriate protocol is selected.
2. If not enough information is given in BC/LLC, the first frame that is received over the B-channel is analyzed and the appropriate protocol is selected.
3. B-channel data is analyzed and the ASYNC/SYNC PPP conversion module is inserted if necessary.

The following protocols can be autodetected in this way:

1. HDLC/Transparent/Transparent
2. HDLC/X.75/Transparent
3. HDLC/X.75 with V.42bis data compression/Transparent
4. HDLC/V.120/Transparent
5. HDLC/V.120 with V.42bis data compression/Transparent
6. V.110/Transparent/Transparent
7. Analog Modem with full negotiation (up to V.90 central office)/V.42+V.42bis or V.42 or Transparent - buffered mode/Transparent
8. PIAFS/PIAFS/Transparent

If the Dialogic® Diva® Media Board is operated on broken ISDN links that provide wrong call-type information over the signaling channel, it might be necessary to force the Dialogic® Diva® TTY driver to handle the incoming calls in a specific way independent of the signaled call type. This functionality is provided by the AT+iE command that affects the virtual TTY interfaces exposed by the Diva TTY driver and can be changed only by unloading the driver or issuing another AT+IE command. ***See AT-command*** set on page 35 for more information on the commands.

ASYNC/SYNC conversion module

The ASYNC/SYNC conversion module is inserted on top of OSI layer 3 and is used for automatic framing type detection and conversion. Together with the B-channel autodetection, this module enables automatic discrimination of the incoming call type and thus allows to set up a RAS server that is able to accept digital, analog, wireless, and PIAFS calls on the same number by a standard ASYNC PPP application. See ***Incoming RAS call type autodetection*** on page 53 for more information.

The ASYNC/SYNC conversion module is controlled by the AT+iF and AT+iG commands. If you select modem profile 14 (AT&F14 or ATZ14), correct values will be set for most applications and B-channel protocol detection will be enabled. See ***AT-command set*** on page 35 for more information.

At the beginning, the ASYNC/SYNC conversion module escapes every control character when it explodes a sync frame because this is the initial state for PPP over asyncronous lines (expected by RNA). Thus 0xffffffff is set as the initial receive ACCM. If the peer does not send an ACCM with its configuration request, a null ACCM added to such a request by default, to prevent the overhead of escaping every control character.

The ASYNC/SYNC conversion module assumes that such frames will never contain unescaped control characters for asynchronous RNA frames. Thus, 0x00000000 is set like the initial transmit ACCM. Because some routers (for example Cisco and NetGW) reject an ACCM on synchronous links, the ASYNC/SYNC PPP conversion module removes (but remembers) the ACCM from outgoing configuration requests by default.

Intelligent fax class 2 processing

The fax class 2 AT-command set provides an easy way to access fax-related functionality.

If you use fax class 2 for fax document processing, you need to be aware of the following problems, that might occur:

- It is necessary to maintain a constant data stream between the application and the fax class 2 device. Any interruption in this data stream will affect the quality of the fax document.
- It is necessary to deal with various low-level T.30 protocol settings like scan line time, compression, error correction, etc.
- Not every applications or devices support the command-set features provided by fax class 2. This limits the functionality and may require modification of the existing application.
- The usage of fax document compression forces you to deal with compressed data (reception), or to be able to generate compressed data stream on demand, or to provide documents in different compression formats (transmission).
- The "classic" fax class 2 application is unable to deal with transmission speeds higher than 14400 bps. To be able use V.34 fax transmission speeds of up to 33600 bps, the application needs to be modified.

This section explains how the Dialogic® Diva® Media Board can overcome these drawbacks and allows you to use the fax class 2 AT-command set to process fax documents with a comparable level of reliability and flexibility as a sophisticated high-level fax API.

Reliable data transfer between application and Dialogic® Diva® Media Board

Dialogic® Diva® Media Boards provide a high-performance block-oriented IDI (ISDN Direct Interface) between the board hardware and the host CPU. The data transfer is performed via a BUS master DMA. This enables a reliable data transfer between the host CPU and the Diva Media Board memory that is not affected by the host CPU load. At the same time, using the BUS master DMA reduces the host CPU load.

The Dialogic® Diva® TTY interface does not perform data processing. It is only used to forward the data stream between the application and the IDI interface, i.e., the virtual or emulated TTY interface. The entire data processing is performed on the RISC CPU of the Diva Media Board. The reliability of the data stream is ensured by the board hardware through buffering (up to 64 Kbytes for every channel) and block-oriented data transfer (blocks of up to 2 Kbytes) via the BUS master DMA.

Automatic T.30 protocol parameter adjustment

The FAX CLASS 2 application can ignore low-level T.30 protocol settings. The T.30 protocol stack that runs on the RISC CPU of the Dialogic® Diva® Media Board is able to perform the required adjustment of transmission parameters to provide reliable and fast document transmission without requiring application intervention.

You can overrule the automatic T.30 protocol parameter adjustment with FAX CLASS 2 commands. If your application does not support the appropriate command set or the required features are not part of the FAX CLASS 2 command set, you can use ***Global fax configuration options*** on page 31 or ***Global Dialogic® Diva® TTY configuration options*** on page 57 to overrule the automatic parameter adjustment.

Support for SEP/SUB/PWD

SEP/SUB/PWD commands are used to address the document recipient and to select or protect the polled document.

The Dialogic® Diva® Media Board's support for SEP/SUB/PWD is transparent to the application. The appropriate features can be activated via ***Global Dialogic® Diva® TTY configuration options*** on page 57 without any application intervention. The received SEP/SUB/PWD frames are delivered to the application via "+FSA:", "+FPA:", and "+FPW:" indications.

ECM (Error Correction Mode) support

You can control ECM support via the FAX CLASS 2 AT-command set or via ***Global Dialogic® Diva® TTY configuration options*** on page 57.

If you use global Diva TTY configuration options to enable ECM support, the Dialogic® Diva® Media Board will use ECM mode for document transfer, if supported by the opposite side.

Diva Media Boards use their internal memory to store document data. They retrieve data for ECM re-transmissions from this internal buffer (up to 64 Kbytes for every channel). This reduces the host CPU load and increases the reliability of the fax transmission.

Document compression support

Dialogic® Diva® Media Boards use MR, MMR, T.6 fax document compression. In order to reduce transmission time, Diva Media Boards select the best compression algorithm supported by the opposite side. The Diva Media Board's RISC CPU is used to re-compress 1D-coded page data from the application to the format requested by the opposite side (transmission) and to convert received data to 1D-coded page data that is sent to the application (reception).

The re-compression process is handled internally by the board's RISC CPU and happens fully transparent to the application that deals only with 1D (MH) coded data.

You can adjust the compression-related T.30 protocol settings via ***Global fax configuration options*** on page 31.

V.34 (33600 bps) fax support

The V.34 fax support can be activated via ***Global Dialogic® Diva® TTY configuration options*** on page 57. If the Dialogic® Diva® Media Board is able to establish a connection with a transmission speed higher than 14400 bps (V.34), it handles this transparent to the application. In order to avoid incompatibility with FAX CLASS 2 applications, the Diva Media Board never indicates transmission speeds higher than 14400 bps to the application. This means that transmission speeds higher than 14400 bps are mapped to 14400 bps.

You can use the ***"divalogd" accounting utility*** on page 73 that uses the Diva Media Board ***Management interface*** on page 73 to get information on the real transmission speed and the used compression algorithm.

Global Dialogic® Diva® TTY configuration options

Global Dialogic® Diva® TTY configuration options allow you to overwrite the parameters passed by the application and to control parameters running on the Dialogic® Diva® Media Board's fax protocols. This provides a high level of flexibility, especially if the application does not provide the required parameters.

TTY configuration options

Option	Description
Default initialization string	This AT command is used to initialize the TTY interface when the application opens this interface. This process is hidden from the application and can be used for compatibility with applications that cannot provide the required TTY-interface initialization.
Enable ECM for FAX CLASS 2	Use ECM, MR, MMR T.6 if supported by the opposite side. The Dialogic® Diva® Media Board handles the conversion between MR/MMR (MMR/MR) compressed data transparent to the application.
Enable V.34 (33600) fax for FAX CLASS 2	Use V.34 (33600) fax if supported by the opposite side. V.34 connections are handled transparent to the application. They are indicated to the application as V.17 (14400) connections.
Enable SEP/SUB/PWD for FAX CLASS 2	Activate support for sub-addressing (SUB), polled document selection (SUB) and document password protection (PWD). Note that this option will increase fax connection time and should only be used if necessary.

Call parameter (BC/LLC) selection

Every ***profile*** see "Supported TTY profiles" on page 52 has its own service/additional service indicator that enables the appropriate selection of Bearer Capabilities (BC) and Low-Layer Compatibility elements for the SETUP message. These indicators are used to filter incoming calls and to tell the remote site which kind of connection the user wants to establish for outgoing calls.

To change these default values for outgoing calls, use the AT commands AT+iS (specify service/add service indicator) or AT+iU (specify BC/LLC values). See ***AT-command set*** on page 35 for more information on the AT commands.

TTY "channel pool" mode

By default, the Dialogic® Diva® TTY interface operates in "channel pool" mode. It presents the available Dialogic® Diva® Media Boards as one board to the user application. This board owns the channels provided by the real Diva Media Boards.

This feature hides the call distribution details from the application and allows creation of servers such as RAS.

You can use the AT+iQ command to control this behavior and to bind specific Diva TTY interfaces to specific Diva Media Boards [7]. See ***AT-command set*** on page 35 for more information.

It is possible to bind specific Dialogic® Diva® TTY interfaces to specific Dialogic® Diva® Media Boards. But it is not possible to bind specific Dialogic Diva TTY interfaces to specific B-channel numbers due to the fact that B-channel resources are automatically assigned by the active signaling protocol.

Handling of incoming calls

Incoming calls are handled in the following sequence of operations:

1. The Dialogic® Diva® Media Board receives a call.
2. The Diva Media Board uses the active signaling protocol to select the B-channel that will be used for this call.
3. The Diva Media Board delivers the call to the Dialogic® Diva® TTY driver.
4. The Diva TTY driver delivers the call to the first application that matches the call type and is ready to receive incoming calls (ATS). See ***AT-command set*** on page 35 for more information on the ATS commands.

Handling of outgoing calls

Outgoing calls are handled in the following sequence of operations:

1. The user application issues a call on an arbitrary Dialogic® Diva® TTY interface.
2. The Diva TTY interface transfers the call request to the first Dialogic® Diva® Media Board that is able to handle this call type and owns free B-channel resources.
3. The Diva Media Board uses the active signaling protocol to select the B-channel that will be used for this call.

"ESCAPE" sequence (+++)

The ESCAPE sequence enables you to switch from ONLINE mode (data transfer mode) to ESCAPE mode (command mode with the connection established in the background).

The ESCAPE sequence includes the following procedure:

1. No data is sent to TTY for 2 seconds.
2. Three "+" characters are sent. The time interval that passes between two "+" characters should not exceed 1 second.
3. No data is sent to TTY for 2 seconds.
4. TTY switches to ESCAPE mode and sends OK response. The response format depends on the ATV and ATQ commands. See ***AT-command set*** on page 35 for more information on these commands.

To switch from ESCAPE back to ONLINE mode, issue the ATO command. To drop the connection and return to COMMAND mode, issue the "ATH" command.

In ESCAPE mode, you can read the S-registers, view the modem profile, and change port timeout and TTY interface related values, but you cannot issue DIAL and ANSWER commands.

To change the ESCAPE character or to disable or enable the ESCAPE sequence, use the S2 S-register.

AT-command responses

Depending on the response code format that is selected by the ATV command, the result code can be delivered as plain text message (direct form) or as numeric code.

The format of the plain text CONNECT command response can be controlled by the AT\V command.

Command responses

Meaning	Direct form	Numeric form
Command accepted	OK	0
CONNECT 300 bps	CONNECT, CONNECT 300	1
Ring indication	RING	2
Carrier lost, switched back to command mode	NO CARRIER	3
Invalid command, command was not accepted	ERROR	4
CONNECT 1200 bps	CONNECT, CONNECT 1200	5
Dial attempt failed (L1 error, L2 error, no free B-channel)	NO DIALTONE	6
Opposite side has rejected the call or is busy	BUSY	7
No equipment on the opposite side has answered the call	NO ANSWER	8
Successful connect to the opposite side	CONNECT, CONNECT + speed and norm. Depends on AT\V	9

See ***AT-command set*** on page 35 for more information on these commands.

If you select the numeric response format (ATV0), CONNECT will be indicated in numeric form in accordance with the numeric CONNECT responses as described in the table below.

Numeric CONNECT responses

Connection speed	Numeric response
14400	9
1200	10
2400	11
4800	12
9600	13
19200	14
38400	15
48000	16

56000	17
64000	18
11111	19
75	20
110	21
150	22
300	23
600	24
2400	26
4800	27
7200	28
9600	29
12000	30
14400	31
16800	32
19200	33
21600	34
24000	35
26400	36
28800	37
31200	38
33600	39
36000	40
38400	41
40800	42
43200	43
45600	44
48000	45

50400	46
52800	47
55200	48
56000	49
57600	50
60000	51
62400	52
64000	53
28000	54
29333	55
30666	56
32000	57
33333	58
34666	59
37333	60
38666	61
40000	62
41333	63
42666	64
44000	65
45333	66
46666	67
49333	68
50666	69
52000	70
53333	71
54666	72

How to set up a dial-in server

This section describes step-by-step how to set up a dial-in server using **mgetty** and **pppd** applications.

The dial-in server is built using the **mgetty** and **pppd** utilities. **mgetty** is responsible for TTY interface initialization and call answering. **pppd** provides a method for transmitting datagrams over point-to-point links and is responsible for link control, authentication, and for network protocol configuration.

The Dialogic® Diva® TTY interface is set in auto-detection mode. In this mode, the TTY driver will detect the type of the used protocol and PPP framing and will convert it to ASYNC PPP. This allows the calls to be served by **pppd** in the same way.

Setting up a "ppp" dial-in server

To set up a dial-in server, proceed as described below:

1. Make sure that the mgetty+sendfax package is installed on your system.
2. Change the context of the /etc/mgetty+sendfax/mgetty.config file as follows:

```
# set the global debug level to "4" (default from policy.h)
#debug 9

# access the modem(s) with 38400 bps
speed 38400

# This is 33600 only
#init-chat "" AT&F14;S0=0;E0;\\V1#CID=1;+ms=v34,1 OK
init-chat "" AT&F14+IF5+IM4;S0=0;E0;\\V1#CID=1 OK

data-only y
blocking no
toggle-dtr no
modem-type data
modem-check-time 0
autobauding no
answer-chat-timeout 180
```

3. Change the context of the /etc/mgetty+sendfax/login.config file as follows:

```
# Automatic PPP startup on reception of LCP configuration request (AutoPPP).
# mgetty has to be compiled with "-DAUTO_PPP" for this to work.
/AutoPPP/ - a_ppp /usr/sbin/pppd modem

#
# Disable login sessions
 #
 *        -             -              /bin/false @
```

4. Add the following lines to the /etc/inittab file, one for every Diva TTY interface that you plan to use for your dial-in server.

```
SXX:2345:respawn:/usr/sbin/mgetty ttydsXX
```

"XX" is the Dialogic® Diva® TTY device number (01, 02, etc.). For example, if one Dialogic® Diva® BRI Media Board with 2 channels is installed in the system, you should add two entries:

```
S01:2345:respawn:/usr/sbin/mgetty ttyds01 S02:2345:respawn:/usr/sbin/mgetty ttyds02
```

5. Make sure that the ppp package is installed on your system.

6. Change the context of the /etc/ppp/options file as follows:

```
#
# Common options for TTY interfaces
#
lock

#
# Debug
#
#debug 9
#kdebug 9
#

modem
noipx
noccp
nodeflate
nobsdcomp
asyncmap 00000000
lcp-echo-interval 10
lcp-echo-failure 5

#
# Set the local system name
#
user roadrunner

#
# Provide address of your DNS server
#
ms-dns 192.168.212.130

nodefaultroute
proxyarp
netmask 255.255.255.255

auth

#
# Two following lines will disable CHAP and allow PAP
#
#require-pap
#refuse-chap

#
# The following option disables the identification via "clear text"
# user name and password transmission and
# enable CHAP and derivates
#
refuse-pap
+chap
+chapms
+chapms-v2

#
# Allows to set idle link timeout
#
#idle 900
```

7. In case you plan to use the PAP authentication protocol, create the file /etc/ppp/pap-secrets:

```
# Secrets for authentication using PAP
# client        server        secret              IP addresses

test1       *           pwdtest1        *
test2       *           pwdtest2        *
```

In case you plan to use the CHAP authentication protocol, create the file `/etc/ppp/chap-secrets`:

```
# Secrets for authentication using CHAP
# client        server        secret              IP addresses

test1       *           pwdtest1        *
test2       *           pwdtest2        *
```

8. Create for every ttydsxx interface that you use for dial-in server (i.e. where **mgetty** was started) one /etc/ppp/options.ttydsxx file that contains the IP addresses for local and remote ends of the PPP link. In this example, the configuration file /etc/ppp/options.ttyds01 contains:

```
#
# Options that differ for every TTY interface (i.e. IP address)
#
# LOCAL IP:REMOTE_IP 192.168.212.240:192.168.212.241
```

9. Optionally, you can use dynamic IP address assignment. Please refer to "pppd" documentation for details.
10. If you plan to allow access from the router to your network, it is necessary to allow IP forwarding: **echo 1 > /proc/sys/net/ipv4/ip_forward**.
11. Execute "kill -HUP 1" to start **mgetty** processes (this command will inform "init" process about changes in the /etc/inittab file).

Now, the dial-in server is running. You can use name/password pairs "test1/pwdtest1" and "test2/pwdtest2" and CHAP/MS- CHAP protocol to gain access to the system.

How to set up a dial-in callback server

A dial-in callback server allows you to gain access to your system using the callback procedure.

The callback procedure allows you to establish the connection, invoke the authentication procedure and provide phone number where the dial-in server will call you back.

The description for setting up a dial-in callback server is based on ***How to set up a dial-in server*** on page 64 and provides only changes.

General Description

The **mgetty** utility is responsible for the initialization of the TTY interface and for the answering of the incoming calls. Once the call establishment is complete, **mgetty** will start the modified pppd utility **pppd.callback**. The **pppd.callback** will establish the PPP link, invoke the authentication procedure and obtain callback parameters. Finally, **pppd.callback** will disconnect the link and execute the user-provided application (script) that will issue the call back.

Setting up a dial-in callback server

1. Set up the dial-in server using ***How to set up a dial-in server*** on page 64. Finally, follow the described procedure below to configure a dial-in callback server.

2. Install the changed ppp.callback ppp application in the /usr/sbin directory.
3. Change the context of the /etc/mgetty+sendfax/login.config file as follows (it uses now the changed ppp application ppp.callback):

```
# Automatic PPP startup on receipt of LCP configure request (AutoPPP).
# mgetty has to be compiled with "-DAUTO_PPP" for this to work.
/AutoPPP/ - a_ppp /usr/sbin/pppd modem

#
# Disable login sessions
 #
 *        -            -              /bin/false @
```

4. Change the context of the /etc/ppp/options file as follows:

```
#
# Common options for TTY interfaces
#

#
# Debug
#
#debug 9
#kdebug 9
#

#
# Allow callback operation and set-up callback script
#

callback 211
callbackscript /etc/ppp/callback.sh


modem

noipx
noccp
nodeflate
nobsdcomp
asyncmap 00000000
lcp-echo-interval 10
lcp-echo-failure 5


#
# Set the local system name
#
user roadrunner

#
# Provide the address of your DNS server
#
ms-dns 192.168.212.130

nodefaultroute
proxyarp
netmask 255.255.255.255

auth

#
# The two following lines will disable CHAP and allow PAP
#
#require-pap
#refuse-chap

#
# the following option disables the identification via "clear text"
# user name and password transmission and
# enable CHAP and derivates # refuse-pap +chap +chapms +chapms-v2
#

# Allows to set idle link timeout
#
#idle 900
```

Note: The "lock" option was removed and two new parameters were added: "callback", which activates callback and provides default callback number, and "callbackscript", which provides the name of a callback application.

5. Create a callback script /etc/ppp/callback.sh as follows:

```
#! /bin/sh

set -e

# Parameter 1 - Callback Address
# Parameter 2 - TTY device name
# Parameter 3 - peer auth name

if [ $(($#)) -lt $((3)) ]
then
            logger -i -t callback.sh Parameter missing > /dev/null 2>&1
            exit 1

 fi
mantool="/usr/lib/eicon/divas/divactrl mantool -b -Exclusive -WDog -c 1001"

#
# Read the callback parameters from the management interface
# phone=$1 tty_dev=$2 tty_nr=$2 name=$3

# parameter is passed as "/dev/ttydsXX"
tty_nr=$(($(echo ${tty_nr} | sed -e "s/^.*ttyds//" -)))

if [ $((tty_nr)) -lt $((1)) ]
then
             logger -i -t callback.sh Invalid tty name $1 > /dev/null 2>&1
             exit 1
fi


#
# Set up the dial script file name
#
dial=/etc/ppp/diva_dial.$((tty_nr))

tty_nr=$(($tty_nr-1))
dir_start=$(($tty_nr/50))
dir_start=$(($dir_start*50))
dir_start=$(($dir_start))
dir_end=$(($dir_start+50))
offset=$(($tty_nr-$dir_start))
offset=$(($offset+1))

atinit=$(${mantool} -rTTY\\TTY$(($dir_start+1))-$((dir_end))\\T$((offset))\\AtInit | sed -e
"/^$/d" - | sed -e "s/^.* = //" -)
protocol=$(${mantool} -rTTY\\TTY$(($dir_start+1))-$((dir_end))\\T$((offset))\\ProtocolName |
sed -e "/^$/d" - | sed -e "s/^.* = //" -) txspeed=$(${mantool} -rTTY\\TTY$(($dir_start+1))-
$((dir_end))\\T$((offset))\\TxSpeed | sed -e "/^$/d" - | sed -e "s/^.* = //" -)

if [ -z "$atinit" ]
then
                atinit="AT&F9"
fi
atinit="${atinit}E1V1"

#
# Check for V.110 (GSM) callback and set the connection parameters
#
baud=""
if [ "$protocol" = "V.110" ]
then
                if [ $((txspeed)) -eq $((38400)) ]
                then
                            baud="+ib7+iu=<8890214d00bb>"
                else
```

6. Change the permissions of callback.sh file to "executable".
7. The callback script receives the callback number, the Dialogic® Diva® TTY device name and the peer name from the command line, i.e., from pppd.callback instance that was responsible for the callback procedure and retrieves the information about used bearer protocol and framing from the management interface of Dialogic® Diva® TTY driver. Finally, "callback.sh" uses the available information to construct dial script and to issue the callback.

How to set up a simple fax polling server (mgetty)

The `mgetty+sendfax` package contains **mgetty** a daemon that allows processing of incoming fax polling requests.

To set up a simple fax polling server, proceed as described below:

1. Make sure that the mgetty+sendfax package is installed on your system.
2. Change the context of the /etc/mgetty+sendfax/mgetty.config file as follows:

```
# Select your preferred debug level here.
# The current global debug level is "4" (default from policy.h).
debug 4

# Set any interface. The exact value is not important
# because the Dialogic® Diva® TTY interface is virtual.
speed 38400

init-chat "" AT?F;S0=0;E0;\\V1#CID=1 OK
#
# Set your FAX ID in the following line
#
fax-id 0123456789

blocking no
toggle-dtr no
modem-check-time 0
answer-chat-timeout 180 fax-only Y
modem-type cls2
```

3. Add the following line to the /etc/inittab file, one for every Dialogic® Diva® TTY interface that you plan to use for faxes.

```
SXX:235:respawn:/usr/sbin/mgetty -S polling ttydsXX
```

"polling" is the name of the fax document to be polled (in G3 format). Optionally, it can be a text file that contains the list of the fax document files (one file name per line). In this case, the files should be in G3 format and will be transmitted as consecutive pages of the same fax document.

"XX" is the Dialogic® Diva® TTY device number (01, 02, etc.). For example, if one Dialogic® Diva® BRI Media Board with 2 channels is installed in the system, you should add two entries:

```
S01:2345:respawn:/usr/sbin/mgetty -S polling ttyds01
S02:2345:respawn:/usr/sbin/mgetty -S polling ttyds02
```

4. Issue **kill -HUP 1** to start **mgetty**.

Uninstallation of the Dialogic® Diva® System Release Software

Before you can uninstall the Dialogic® Diva® System Release software, you need to unload the Dialogic® Diva® driver modules.

Unloading the Dialogic® Diva® driver modules:

The Diva driver modules can be unloaded simply by executing: **/usr/lib/opendiva/divas/Stop**

If you wish to stop and unload the Diva drivers modules manually, proceed as described below:

1. Login as "root" (or use **su -**).
2. If you have started any tools that access the CAPI or Dialogic® Diva® TTY interfaces, stop these tools to release the interfaces.
3. If you have modified /etc/inittab or /etc/ttys to start getty/mgetty/ppp on one of the Diva TTY interfaces, remove these entries from these files and execute **kill -HUP 1**.
4. Check that the Divastty, capi and divacapi modules are not busy (call **lsmod** to check it).
5. Execute **rmmod capi && rmmod divacapi && rmmod kernelcapi** to unload the CAPI drivers.
6. Execute **rmmod Divatty** to unload the Dialogic® Diva® TTY drivers.
7. Execute **rmmod diva_idi && rmmod divas && rmmod divadidd** to stop and unload the XDI drivers.

Uninstalling the Dialogic® Diva® System Release Software

To uninstall the Diva System Release software package, login as *root* (or use **su -**) and execute:

For the Debian package: **dpkg -r xxx.deb**, where xxx is the Debian package name.

For the RPM package: **rpm -e divas4linux_<a_b_cc_dd>_<ee>-<ff-xxx.yy- z>** [8] [9] [10] where *divas4linux_<a_b_cc_dd>_<ee>-<ff-xxx.yy-z>* is the name of the installed rpm package without the *.i386.rpm* extension.

If you have installed the package *divas4linux_2_2_16-101.2-1.i386.rpm*, execute **rpm -e divas4linux_2_2_16-101.2-1** in order to uninstall this package.

You can manually remove the Diva System Release software files from your system, but this is not recommended as it will leave the package entry in the RPM database and may cause problems reinstalling the package. Manual removal might become necessary if your RPM database was corrupted or destroyed. To uninstall the Diva System Release package manually, proceed as described below:

1. Login as root (or use **su**).
2. Change the working directory to /usr/lib/eicon/divas (**cd /usr/lib/eicon/divas**).
3. Execute: **sh ./cfg_util.sh 2**.
4. Execute: **./divas_stop.rc**. [8] [9]
5. Execute **rm -rf /usr/lib/eicon/divas**.
6. Execute **rm -rf /usr/doc/packages/divas4linux***

Management interface

The management interface can be used to control the Dialogic® Diva® Media Board configuration at run time without reloading or restarting the Diva Media Board. It can also be used as source of information and events for an SNMP interface, call statistics and accounting utilities, or other management applications.

The management interface is located on the Diva Media Board (or in the device driver). It is structured like a virtual file space, containing directories and variables. Each directory and variable is identified by its path and name. A path contains a directory name followed by a specific variable or subdirectory that is separated by a backslash "\".

Variables can have the following functions:

Type	Description
Variable	Standard variable that can be read or written
Function	Variable that can be executed and does not provide a value
Event	Variable that can be read and used as source of events which are generated when the state (value) of this variable changes

"divalogd" accounting utility

The **divalogd** accounting utility uses the sources of information contained in the management interface and maintains a detailed call log journal. Based on the information from **divalogd**, you can provide accounting services and control the quality of the provided services.

divalogd stores the call log to the file **/var/log/divalog**. On every daemon/system restart, the logfiles are rotated: **/var/log/divalog** is renamed to **/var/log/divalog.1**, etc. Up to 10 log files are stored.

"divalogd" parameters

Parameter	Description
-Debug	Do not detach from the controlling terminal. If you do not use this option, divalogd becomes a background process.
-h or -? or --help	Help

Note: There is a similarly named shellscript ***divalog*** see "XLOG trace mode" on page 94, which can be used to retrieve trace information.

Management interface access and monitoring utility

The **divactrl** package contains the `mantool` utility that allows you to access (read, write or execute) directories and variables of the management interface. It also allows you to turn on events and receive notifications from these events when the corresponding state of the variable changes.

This utility can be used to capture additional statistics or create ISDN firewall services [11] with its own system of events.

Based on the information from the management interface it is possible to clear calls that meet specific criteria, e.g., calling party number, fax ID, and fax polling address.

To start the Mantool utility, type: **/usr/lib/opendiva/divas/divactrl mantool -c <x> <parameters>"[<path>]**

Where <x> is the logical Dialogic® Diva® Media Board number, <parameters> specify the action to be taken, and <path> is the path to the directory or variable in the management interface that you want to access.[12] [13] [14] [15]

If you use the `mantool` from scripts, i.e., not interactively, add the "-b" option to turn the interactive mode off.

"-m", "-a", and "-g" parameters can be used in combination.

"-m", "-a", and "-g" parameters can be used in combination.

The "-w" parameter can only be used with variables that have the "W" attribute.

The following parameters can be used with the Mantool utility:

Parameters	Description
-r	Reads the content of management interface directory or variable specified in <path>.
-w	Sets the value of the management interface variable specified in <path>.
-e	Executes the management interface function specified in <path>.
-m	Monitors incoming/outgoing calls (line activity).
-a	Monitors state changes of analog modem hardware (connection progress and reporting).
-g	Monitors state changes of fax G3 hardware (connection progress and status reporting).
-Exclusive	Obtains exclusive access to the management interface. In this mode `mantool` will use the file lock to obtain exclusive access to the board. Normally, it is necessary to get access to the management interface of the device driver that supports only one management entity. The lock operation will time out after 10 sec. In this case `mantool` will return error.
-WDog	Use 20 sec timeout for management interface operation. This may be necessary if `mantool` is invoked from script and should not block for undetermined amount of time.
-b	Informs `mantool` that it was invoked from the script. In this mode `mantool` will newer block and wait for user input and will not print the copyright header.

Management interface structure

The management interface is structured like a virtual file space, containing directories with variables. The set of operations that is valid for each variable depends on the variable type and attributes.

Management interface variable types

Type	Description
MI_DIR	Directory
MI_HINT	Unsigned integer with hexadecimal representation, variable length
MI_UINT	Unsigned integer, variable length
MI_ASCIIZ	ASCII string, zero terminated
MI_ASCII	ASCII string, counted
MI_BOOLEAN	Boolean value
MI_BITFLD	Unsigned integer, representation as bit field, variable length
MI_EXECUTE	Variable represents executable function

Management interface variable attributes

Attribute	Description
RO	Read only
W	Writable
EVENT	Variable can be used to generate event (notification)

Dialogic® Diva® Media Board management interface directory

The ***Dialogic® Diva® Media Board management interface*** on page 111 is located on the Dialogic® Diva® Media Board. It is structured like a virtual file space, containing directories and variables. Each directory and variable is identified by its path and name. A path contains a directory name followed by a specific variable or subdirectory that is separated by a backslash "\".

Management interface root directory

Name	Type	Attribute	Description
CardType	MI_UINT	RO	Dialogic® Diva® Media Board type
MIF Version	MI_HINT	RO	Version number of the management interface
Build	MI_ASCIIZ	RO	Name and build number of the protocol file
Events down	MI_UINT	EVENT	Any variable's event tracing is paused until internal resources are re-available
Info	MI_DIR		
Config	MI_DIR		Selected protocols and their parameters, hardware state. This directory is especially designed to use with other configuration tools like CfgLib
Statistics	MI_DIR		Statistics counters etc.
State	MI_DIR		State of B-channels
StateT	MI_DIR		State of time slots
Trace	MI_DIR		Trace functions (every application instance will receive an individual copy of the trace information)

Management interface info directory

Name	Type	Attribute	Description
CardType	MI_UINT	RO	Dialogic® Diva® Media Board type
SerialNumber	MI_UINT	RO	Serial number of Diva Media Board
InterfaceNr	MI_UINT	RO	XXX
BoardRevision	MI_UINT	RO	Hardware revision of Diva Media Board
SubFunction	MI_UINT	RO	Sub-function
SubDevice	MI_UINT	RO	XXX
ProtocolBuild	MI_ASCIIZ	RO	XXX
DSPCodeBuild	MI_ASCIIZ	RO	XXX

PRI	MI_BOOLEAN	RO	Dialogic® Diva® PRI Media Board or Dialogic® Diva® BRI Media Board
Channels	MI_UINT	RO	Number of channels
AnalogChannels	MI_UINT	RO	Number of channels with modem capability
PCIDMA	MI_BOOLEAN	RO	Successfull test of PCI DMA capability
IndentifyStart	MI_EXECUTE	RO	Start Diva Media Board identification procedure
DSPState	MI_BITFLD	RO	Bit field to identify presence of DSPs

Management interface Statistics\Outgoing Calls directory

Name	Type	Attribute	Description
Calls	MI_UINT	EVENT	Number of requested calls
Connected	MI_UINT	EVENT	Number of successful calls
User busy	MI_UINT	RO	Number of calls refused because the user was busy
No Answer	MI_UINT	RO	Number of calls refused because remote station did not answer
Wrong Number	MI_UINT	RO	Number of calls refused because an invalid number was dialed
Out of Order	MI_UINT	RO	Number of calls refused because remote station was out of order
Incompatible Dst	MI_UINT	RO	Number of calls refused because of incompatible destination
No Channel Avail	MI_UINT	RO	Number of calls refused because no channels were available
Call rejected	MI_UINT	RO	Number of calls refused because remote station rejected the call
Other failures	MI_UINT	RO	Number of calls refused because of other reasons than the ones listed above
Clear values	MI_EXECUTE		Resets the values in this directory

Management interface Statistics\Incoming Calls directory

Name	Type	Attribute	Description
Calls	MI_UINT	EVENT	Number of incoming calls
Connected	MI_UINT	EVENT	Number of accepted calls
User busy	MI_UINT	RO	Number of calls refused because the user was busy

Call rejected	MI_UINT	RO	Number of calls refused because they were rejected
Wrong number	MI_UINT	RO	Number of calls refused because an invalid number was dialed
Incompatible Destination	MI_UINT	RO	Number of calls refused because the destination was not compatible with the TE
Out of Order	MI_UINT	RO	Number of calls refused because destination was out of order
Ignored	MI_UINT	RO	Number of calls refused because the call was ignored
Other failures	MI_UINT	RO	Number of calls refused because of other reasons than the ones listed above
Clear values	MI_EXECUTE		Resets the values in this directory

Management interface Statistics\B/D-Layer1/2 directory

Name	Type	Attribute	Description
X-Frames	MI_UINT	RO	Number of frames sent
X-Bytes	MI_UINT	RO	Number of bytes sent
X-Errors	MI_UINT	RO	Number of detected transmit errors
R-Frames	MI_UINT	RO	Number of received frames
R-Bytes	MI_UINT	RO	Number of received bytes
R-Errors	MI_UINT	RO	Number of detected receive errors

Management interface Trace directory

Name	Type	Attribute	Description
B-Ch# Enable	MI_BITFLD	W	Bit field to enable specific B-channels
Debug Level	MI_HINT	W	Upper limit of debug events to log
D-HW Txt Mask	MI_BITFLD	W	D-channel hardware trace mask
B-HW Txt Mask	MI_BITFLD	W	B-channel hardware trace mask
Misc Txt Mask	MI_BITFLD	W	Trace mask for various use
Event Enable	MI_BITFLD	W	Bit field to enable specific trace events
Max Log Length	MI_UINT	W	Maximum number of data bytes in trace

Log Buffer	MI_TRACE	EVENT	Trace information: L1, D-channel, B-channel and debug information

Dialogic® Diva® TTY management interface directory (Port Manager)

The ***Dialogic® Diva® TTY driver management interface*** on page 113 is located in the TTY device driver. It is structured like a virtual file space, containing directories and variables. Each directory and variable is identified by its path and name. A path contains a directory name followed by a specific variable or subdirectory that is separated by a backslash "\". TTY driver management interface is accessible via logical Dialogic® Diva® Media Board number 1001. The TTY driver provides only one management entity, and cannot be accessed by multiple applications simultaneously. For this reason, the user should perform access in "exclusive" mode (**divactrl mantool -Exclusive -c 1001 -r**). In exclusive mode, divactrl mantool will use the file lock to synchronize the access to the management interface fully transparent to the caller.

You can use the management interface of the Dialogic® Diva® TTY driver to obtain information about the Diva TTY driver, to change the configuration of the TTY driver and to view and to control the state of the Dialogic® Diva® TTY interfaces.

Dialogic® Diva® TTY driver configuration directory

The "GlobalOptions" management interface directory allows to change the values of the configuration parameters that affect the TTY interfaces (global configuration parameters). The values of these parameters are passed to the TTY driver module at load time. Using the management interface allows for changing of the values of parameters at run time.

GlobalOptions

Name	Type	Attribute	Description
GlobalOptionsRaw	MI_HINT	W	Bitmask that reflects values of the boolean configuration parameters.
FAX_FORCE_ECM	MI_BOOLEAN	W	Use ECM, MR, MMR T.6 if supported by the opposite side. The Dialogic® Diva® Media Board handles the conversion of MR/MMR (MMR/MR) compressed data transparent to the application
FAX_FORCE_V34	MI_BOOLEAN	W	Use V.34 (33600) fax if supported by the opposite side. V.34 connections are handled transparently to the application. They are indicated to the application as V.17 (14400) connections
FAX_FORCE_SEP_SUB_PWD	MI_BOOLEAN	W	You can activate SEP/SUB/PWD (polled document selection, sub- addressing and polled document password protection). The Dialogic® Diva® TTY will report appropriate frames (if received) to the application. WARNING: Activate this option only if you really use the requested features. Otherwise it will slow down the connection establishment
TTY_INIT	MI_ASCIIZ	W	TTY interface initialization string. You can use this parameter if your application cannot init the TTY interface

TTY Call filter directory

The "CallFilter" management interface directory allows for configuration of the call filters. The call filter allows for processing of the calls with a specific Calling Party Number with a preconfigured protocol, instead of using the protocol auto-detection procedure. This can be necessary for callers with non-standard behavior, that does not allow reliable detection of the bearer protocol.

CallFilter directory

Name	Type	Attribute	Description
TotalFilters	MI_UINT	R	Total amount of available call filters
ActiveFilters	MI_UINT	R	Total amount of used filters
AvailableProtocols	MI_UINT	R	Comma-separated list of the protocols that can be used in call filters
FXX-YY	MI_DIR	R	Directory that contains 50 (F1...F50) call filters
Reset	MI_EXECUTE	R	Used to clear and to de-activate the filters

Every call filter consists of two entries: Calling Party Number and protocol to be used. The numbers are compared from behind, i.e., 123 with math 123, 77123, 721999123, ...

Call Filter entry

Name	Type	Attribute	Description
Nr	MI_UINT	R	Filter number
Number	MI_ASCIIZ	W	Calling Party Number
Protocol	MI_ASCIIZ	W	Protocol name
Reset	MI_EXECUTE	R	Used to clear and to de-activate current filter

TTY Port Manager directory

The "TTY" management interface directory allows you to control the state of the available TTY interfaces (TTY ports). Moreover, it is possible to issue one "DTR drop" to the TTY interface that will clear the connection and re-initialize the selected TTY interface.

Applications can use the context of this directory to retrieve the information about the last processed call (detected protocol, bit rate, calling party number, ...) and use this information for example for call-back.

Port Manager

Name	Type	Attribute	Description
Count	MI_UINT	R	Total amount of ports available in the system
Open	MI_UINT	R	Total amount of ports in use
Connected	MI_UINT	R	Total amount of established connections
TXX-YY	MI_DIR	R	Directories that contains information about TTY interfaces

Port Status

Name	Type	Attribute	Description
Nr	MI_UINT	R	Port number
Open	MI_ASCIIZ	R	Port status; indicates if current port is in use
DCD	MI_BOOLEAN	R	Indicates status of the DCD line
Connected	MI_ASCIIZ	R	Indicates status of the connection
SystemName	MI_ASCIIZ	R	Name of the device node in the "/dev" directory
Protocol	MI_UINT	R	Protocol used to process current (last) call
ProtocolName	MI_ASCIIZ	R	Name of the protocol used to process current (last) call
Profile	MI_UINT	R	TTY profile to select protocol used to process current (last) call
AtInit	MI_ASCIIZ	R	AT command to select protocol used to process current (last) call
TxSpeed	MI_UINT	R	Current (last) transmission speed
RxSpeed	MI_UINT	R	Current (last) reception speed
DTR drop	MI_EXECUTE	R	Used to issue "DTR drop" on current TTY interface

Dialogic® Diva® CAPI management interface directory

The ***CAPI driver management interface*** on page 112 is located in the CAPI device driver. It is structured like a virtual file space, containing directories and variables. Each directory and variable is identified by its path and name. A path contains a directory name followed by a specific variable or subdirectory that is separated by a backslash "\". The CAPI driver management interface is accessible via logical adapter number 1000, i.e., **divactrl mantool -Exclusive -c 1000 -r**. The CAPI driver provides only one management entity and cannot be accessed by multiple applications simultaneously. For this reason, the user should perform access in "exclusive" mode (**divactrl mantool -Exclusive -c 1001 -r**). In exclusive mode, the `divactrl mantool` will use file lock to synchronize the access to the management interface in a fully transparent way to the caller.

You can use the Management interface of the CAPI driver to obtain information about CAPI boards, applications, and PLCIs or to change the configuration of the CAPI driver.

Dialogic® Diva® SNMPX extension agent

Using the AgentX protocol `Diva SNMPX` extends an existing snmp master agent to provide runtime data of installed Dialogic® Diva® Media Boards. It provides call and line statistics as well as status and errors. Supported OIDs include the MIB-II ifTable (RFC 1213/2233), which is standard in the known SNMP-management applications as well as subsets of DS1-MIB (RFC2495), ISDN-MIB (RFC2127) and DIALCONTROL-MIB (RFC2128) and interface/channel state traps (RFC2233).

Requirements

- Net-SNMP v5.0.6 or higher

SNMP agents are included in most Linux distributions. Most distributors bundle the UCD-SNMP or Net-SNMP packages. The required version is Net-SNMP v5.0.6 or higher. To check your version use the command **snmpd -v** and upgrade if necessary. It is vital that AgentX is fully supported by this master agent.

To download the newest version of Net-SNMP, browse the ***Net-SNMP Project Homepage*** http://www.net-snmp.org

Configuration of the SNMP master agent

To configure and secure the SNMP master agent correctly, read the corresponding documentation and FAQ. For the impatient, a quickstart is provided here:

Configure the SNMP master agent as follows:

1. The system wide snmpd configuration file can reside in arbitrary locations. Most commonly you can find it in /usr/[local/]share/snmp/snmpd.conf or /etc/snmpd.conf. It can be created and modified by using the command **snmpconf -i**, which presents a configuration menu for most of the possible options. To get a basically working (and *insecure*) configuration, you have to configure at least the following items:

   - Access Control: Create a SNMPv1/v2c read- only community, enter a community string, an IP range and a starting OID. For testing purposes, use e.g., "mycomm, (no restriction), (no restriction)".

   - Agent Operating Mode

     - "Should the agent operate as a master agent or not?": Enter "agentx".

     - "IP address and port number": Specify the listening address and port, e.g., localhost:161

2. Start the SNMP master agent (or restart if it is already running).

3. Issue the command **snmpwalk -c mycomm localhost interfaces**. This will walk the interfaces MIB tree. You should (at least) see data for the loopback- and ethernet interfaces. If you get a timeout, check the above configuration. If you still have no success, delete the configuration file and start from the beginning. Dialogic cannot provide support for this part of the configuration, but there are resources on the internet, such as the ***Net-SNMP Project Homepage*** http://www.net-snmp.org/.

Activation of Dialogic® Diva® SNMP support

You can activate Diva SNMP support using the WEB-based **System configuration** or using the console-based **Config** application.

You can activate the Diva SNMP extension manual by the following command:
/usr/lib/opendiva/divas/divasnmpx. If there is a master SNMP agent running, **divasnmpx** attaches to its AgentX socket `/var/agentx/master`. On failure, it retries to open the socket every 10 seconds. This also applies during shutdown/restart of the SNMP master agent: Dialogic® Diva® `SNMPX` automatically reattaches to the master socket as soon as it is available again.

`Diva SNMPX` automatically detects the start of new Dialogic® Diva® Media Boards and the shutdown of existing Diva Media Boards and uses interface state traps to indicate these events to the management application.

Command line options:

- -f Do not fork into background. Error messages are logged to stdout instead of syslog. Exit with "q" or "CTRL-C".
- -s No error logging. Disable logging of error messages to syslog or stdout, depending on operating mode.
- -oN Specify offset for ifIndex. The Dialogic® Diva® System Release software entries in MIB-II's interfaces.ifTable are indexed by a number starting from this offset + 1. Default value is "- o100".
- -h Command line help.

Reference: Supported OIDs

This section provides information about supported MIBs, OIDs, and traps by Dialogic® Diva® SNMPX and about the relationship between supported OIDs and Dialogic® Diva® Media Board management interface variables.

OIDs provided by Diva SNMPX

MIB-II (RFC 1213/2233)	Path	Description
MIB-II	interfaces.ifTable.ifEntry.	
	ifIndex	Unique index of Dialogic® Diva® interfaces starting with ifIndex-offset + 1 (see option -oN). First, the installed Dialogic® Diva® Media Boards are listed, followed by the available B-channels.
	ifDescr	For Diva Media Boards, the board name and it's serial number are returned. For B-channels, the string "BRI + ifIndex_of_adapter + number_of_b- channel_on_adapter" is returned.
	ifType	The type of the interface according to IANA: PRI, BRI, ISDN
	ifMTU	Since the concept of MTU is not applicable on Diva interfaces, they return 0.
	ifSpeed	The maximum interface speed in bps
	ifAdminStatus	Always up
	ifOperStatus	The current operating status of the interface
	ifInBytes, ifInPackets, ifInErrors, ifOutBytes, ifOutPackets, ifOutErrors	For boards, the added values of the D- and B-channel interface counters are returned. **divactrl mantool** reports these values in the following paths "Statistics\\[D|B]- Layer2\\[R|X]-[Bytes|Frames|Errors]". For B-channels, the following values are reported: "State\\B[n]\\L2 Stats\\R- [Bytes|Frames|Errors]".
	ifPhysAddr	Returns vendor-id, PnP-id, serial number of Diva Media Boards formatted as hex string. Returns no information for B-channels.
	LinkUp/LinkDown Traps	For status changes of interfaces a trap is generated that includes the appropriate ifOperStatus varbind. Trap destinations and access parameters must be configured in the underlying master agent (trapsink, etc.).

ISDN-MIB (RFC2127)	transmission.isdnMib.isdnMibObjects.isdnSignalingGroup	
	isdnSignalingGetIndex	Number of possible D-channels (equals number of installed Diva Media Boards)
ISDN-MIB	transmission.isdnMib.isdnMibObjects.isdnBasicRateGroup .isdnBasicRateTable.isdnBasicRateEntry	Dialogic® Diva® BRI Media Boards
	isdnBasicRateIfType	isdns or isdnu (IANA-ifType 75, 76)
	isdnBasicRateLineTopology	pointToPoint or pointToMultipoint
	isdnBasicRateIfMode	TE mode or NT mode
	isdnBasicRateSignalMode	D-channel active or inactive
ISDN-MIB	transmission.isdnMib.isdnMibObjects.isdnBearerGroup.isdnBearerTable.isdnBearerEntry	B-channels
	isdnBearerChannelType	dialup or leased
	isdnBearerOperStatus	idle, active, unknown
	isdnBearerChannelIndex	Index of B-channel per Diva Media Board
	isdnBearerPeerAddress	Remote address
	isdnBearerPeerSubAddress	Remote sub address
	isdnBearerCallOrigin	Answer or originate
	isdnBearerInfoType	Info type as per Q.931 (unrestrictedDigital)
	isdnBearerCallConnectTime	Time measured from start of divasnmpx
DIAL-CONTROL-MIB	transmission.dialControlMib.dialControlMibObjects.callActive.callActiveTable.callActiveEntry	
	callActiveSetupTime	Timeticks at start of call, measured from start of **divasnmpx**.

	callActiveIndex	Unique index
	callActivePeerAddress	Address of remote partner
	callActivePeerSubAddress	Subaddress of remote partner
	callActivePeerId	Always 0 (unknown)
	callActivePeerIfIndex	Always 0 (unknown)
	callActiveLogicalIfIndex	Index of entry in ifTable for the interface used by this call
	callActiveConnectTime	0 if the call was not connected, otherwise timeticks measured from start of **divasnmpx**.
	callActiveCallState	State of call
	callActiveCallOrigin	Direction of call: Answer or originate
DIAL-CONTROL-MIB (RFC2128)	transmission.dialControlMib.dialControlMibObjects.callHistory	
	callHistoryTableMaxLength	The maximum number of entries in the callHistoryTable (read/write).
	callHistoryRetainTimer	The minimum amount of time in minutes that a callHistoryEntry will be maintained before being deleted.
DIAL-CONTROL-MIB	transmission.dialControlMib.dialControlMibObjects.callHistory.callHistoryTable.callHistoryEntry	
	callHistoryPeerAddress	Address of remote partner
	callHistoryPeerSubAddress	Subaddress of remote partner
	callHistoryPeerId	Always 0
	callHistoryPeerIfIndex	Always 0
	callHistoryLogicalIfIndex	Index of entry in ifTable for the interface used by this call.
	callHistoryDisconnectCause	Reason for disconnecting this call
	callHistoryDisconnectText	empty
	callHistoryConnectTime	Timeticks measured from start of **divasnmpx**.

	callHistoryDisconnectTime	Timeticks measured from start of **divasnmpx**.
	callHistoryCallOrigin	Direction of call: Answer or originate.

After installation, the MIB files for the ISDN-, DIAL-CONTROL-, and DS1-MIB can be found in directory `/usr/lib/opendiva/divas/mibs`. These definitions can be imported in any management application to decode the OIDs reported by **divasnmpx**. For net-snmp simply copy these files to the standard MIB path (usually `/usr/local/share/snmp/mibs`) and tell the snmp command line tools to use them by exporting/setting the environment variable "MIBS" with the names of the appropriate MIBs (or simply the keyword ALL). E.g. **export MIBS=ALL**.

Troubleshooting

The troubleshooting section is divided into two sections. The first section deals with general installation problems that can occur, and outlines the steps to take to report the problems, if they do occur to Dialogic Customer Support. The second section deals with test tools that allow you to verify board configuration and to investigate connectivity problems, should they occur.

Support procedure

If you have any problems loading the Dialogic® Diva® System Release software driver modules, (you do not see the `divadidd`, `divas`, `diva_idi`, `kernelcapi`, `divacapi`, `capi`, or `Divatty` modules listed when you execute the **lsmod** command) or if your computer crashes or freezes after you have loaded the drivers, use the Dialogic® Diva® Support Wizard. To start the Diva Support Wizard, execute **/usr/lib/opendiva/divas/Support**. The Diva Support Wizard allows you to select a problem profile and guides you through the maintenance process.

If you observe a total system failure and the Diva Support Wizard is not able to proceed until the end, then restart the Diva Support Wizard and select problem profile number `5`. In this mode, the Diva Support Wizard captures system information that allows the Dialogic Customer Support personnel to replicate your system environment. For this operation, your system should have at least 50 MB of free disk space.

The Diva Support Wizard will create a report file and inform you about the location and the name of the file. Add this file together with a detailed problem description to your support request.

Dialogic® Diva® Trace Wizard

If application problems occur; for example, you cannot connect to a specific number, the application returns an error, the application does not receive notifications of incoming calls, or any other failure at the application layer, Dialogic® Diva® Media Board and driver debug traces are required to analyze the problem.

To create the required driver trace files, execute the following command: **/usr/lib/opendiva/divas/Trace**, select the appropriate trace profile and activate the trace daemon.

To stop the Diva Trace Wizard, execute **/usr/lib/opendiva/divas/Trace** again and select `Stop trace daemon and compress trace file`. The Diva Trace Wizard will inform you about the location of the trace file.

You can use **/usr/lib/opendiva/divas/divactrl ditrace -i ditrace.bin >tracefile.txt** to convert the binary trace file into a text file.

D-channel trace and health monitoring utility

The **divactrl** package contains a D-channel trace tool that allows you to capture D-channel messages and monitor the layer 1 and layer 2 states of the ISDN interface on the selected Dialogic® Diva® Media Board. It operates in two modes: trace mode and monitor mode. In trace mode, the D-channel monitor serves as ISDN diagnostic or trace tool. Its output can be traced for different events allowing you to create your own monitoring tools.

D-channel trace mode

To start the D-channel monitoring tool in trace mode, execute: **divactrl dchannel -c <x> [<parameters>]**, where: <x> is the logical Dialogic® Diva® Media Board number to be traced.

Started without optional parameters, the D-channel monitoring tool captures the messages received or sent over the D-channel (including the layer 2 header) and writes a hex dump of these messages as ASCII characters to the standard output.

```
DTRC: 02 01 01 01 DTRC: 00 01 00 02 08 01 82 0D 18 01 89
```

The following optional parameters can be used to change the destination type of the output:

Parameter	Description
-xlog	Use the Dialogic "xlog" format to output D-channel messages. This format uses the header D-[R,X](<Y>), where "R" is used for received messages, "X" is used for sent messages and "Y" is the message length including the layer 2 header. (Example: D-R(004) 02 01 01 01).
-syslog	Redirect the output to the system log file. Every record in the system log receives a header that contains the logical Dialogic® Diva® Media Board number, the Diva Media Board name, and the Diva Media Board's serial number.
-dmonitor	This option allows you to output additional trace information containing layer 3 messages as seen by the internal state machine (as hex dump, without layer 2 header) and layer 3, layer 2, and layer 1 state events in decoded plain text. See the example for a D-channel trace output for details.
-Silent	Do not print messages to standard output or standard error log. Exit silently in case of an error and report the error by return code only.

Example for a D-channel trace output

```
SIG-X(004) 08 01 82 01
        Q.931 CR82 ALERT
SIG-X(007) 08 01 82 0D 18 01 89
        Q.931 CR82 SETUP_ACK
        Channel Id 89
SIG-R(004) 08 01 02 0F
        Q.931 CR02 CONN_ACK
SIG-R(008) 08 01 81 5A 08 02 80 D8
        Q.931 CR81 REL_COM
        Cause 80 d8 "Incompatible destination"
EVENT: Call failed in State "Call initiated"
        Q.931 CR81 REL_COM
        Cause 80 d8 "Incompatible destination"
L1_DOWN
SIG-EVENT FFFF 08
ACTIVATION_REQ
L1_DOWN
SIG-EVENT FFFF 08
ACTIVATION_REQ
L1_UP SIG-EVENT FFFA 00
```

D-channel monitor mode

In monitor mode, the D-channel monitor runs in the background as daemon and reports status changes of layer 1 and (or) layer 2 to the user applications that are executed if the status changes.

To start the D-channel monitoring tool in monitor mode, execute: **divactrl dchannel -c <x> -monitor <y> [<parameters>]**

D-channel monitor mandatory parameters

Parameter	Description
x	The logical board number to be traced.
y	The user application [a] to be executed if the state of layer 1 or layer 2 changes. [b] This application is called with three parameters: 1 - Logical board number, 2 - Layer that changes its state (1 for layer 1, and 2 for layer 2), 3 - State after change (1 - UP, 0 - DOWN). The included `dchannel_monitor` sample application (shell script) can be used to notify the system administrator via email.

Notes:
[a] The **dchannel_monitor** shell script is provided as example and can be used to notify the system administrator (root account) about the link state via email.
[b] If the D-channel monitor fails to start the application or the application exits with an error, the D-channel monitor will report the failure to the system log.

D-channel monitor optional parameters

Parameter	Description
-l1off	Does not monitor changes of the layer 1 status
-l2off	Does not monitor changes of the layer 2 status. This might be necessary for BRI interfaces if layer 2 is controlled by the NT side or is established "on Demand"
-syslog	Redirects output to the system log file. Every record in system log will receive a header that contains the logical board number, board name, and the board's serial number
-dmonitor	This option allows you to output additional trace information to the system log. See the example in ***D-channel trace mode*** on page 90.

Dialogic® Diva® Media Board health monitoring utility

The Dialogic® Diva® Media Board health monitor contained in the **divactrl** package allows you to control the operating status of the Dialogic® Diva® Media Board. This utility uses the Dialogic® Diva® XLOG interface [16] to control that the board remains in the operating (active) state.

Whenever Dialogic® Diva® Media Board `health monitor` is running, the XLOG interface is busy and cannot be used by other utilities.

To start the board health monitor, execute: **divactrl load -c X -CardMonitor - File Y**, where "X" is the Diva Media Board number to be monitored and Y is the file provided by the user to be executed in case of board failure.

If the board fails, the `Diva Media Board health monitor` will write the appropriate information to the system log and exit. Optionally, it can execute a user provided application. The sample shell script **card_monitor** can be used to notify the system administrator via email.

You can modify `card_monitor` or create your own script or application that restarts the failed board and the board `monitor`. You can restart the Diva Media Board fully transparent to applications and without unloading the interface drivers - the active connections will receive a DISCONNECT.

XLOG trace and debug utility

The XLOG trace and debug utility provides access to the Dialogic® Diva® Media Board's XLOG interface. The XLOG interface is a low-level debug interface that should be used if other debug capabilities (via the management interface) fail or cannot be used for other reasons.

XLOG trace mode

The following trace information is accessible via the XLOG interface:

- D-channel traces
- B-channel traces (first 24 bytes)
- Layer 1 interface events
- Layer 2 events
- Debug information

You can access this information using the following commands:

Command	Description
divactrl load -c <x> -ReadXlog	Reads XLOG information from board <x>, decodes it, and prints it to standard output.
divactrl load -c <x> -ReadXlog -File <y>.txt	Reads XLOG information from board <x>, decodes it, and writes it to file <y>.txt.
	The shellscript divalog provides an abbreviation for divactrl -ReadXlog. Note that this is different from the similar ***named "divalogd" accounting u***tility on page 73.
divactrl load -c <x> -FlushXlog	Reads XLOG information from board <x>, decodes it, and prints it to standard output. Exits after no more XLOG messages are available.
divactrl load -c <x> -FlushXlog -File <y>.txt	Reads XLOG information from board <x>, decodes it, and writes it to file <y>.txt. Exits after no more XLOG messages are available.

Core dump generation mode

If the Dialogic® Diva® Media Board state is changed to *trapped* [17] and you cannot access the Diva Media Board's debug or trace information via XLOG, i.e., board firmware problem, you can create a core dump of the board memory. This file can be used by the Dialogic Customer Support to extract debug information and analyze the board's state.

To find out the state of a logical adapter <x>, execute: **/usr/lib/opendiva/divas/divactrl load -c <x> -CardState**.

To generate a core dump of the Diva Media Board <x> and store it to the file core.bin, execute: **/usr/lib/opendiva/divas/divactrl load -c <x> - CoreDump -File core.bin**. [18]

Execute this command after the Dialogic® Diva® Media Board is in a *trapped* state.

tty_test utility

The **tty_test** utility contains a test server, a test client, and a small terminal application. The test client calls the test server. When the connection is established, the client starts to generate test frames and to transmit these frames to the test server. The test server loops the received data back to the transmitter (client). The test client verifies the received frames based on sequence number and check sum, and generates link statistics. The **tty_test** utility is located in the `/usr/lib/eicon/divas` directory.

tty_test in server mode

The test server can be started with the following commands:

Command	Description
tty_test <tty_nr> s <protocol> [-l<frame_length> -s<rate>]	This command starts a test server on your console. You can see the messages from the TTY interface and the link statistics generated by the receiving side.
tty_test <tty_nr> sv <protocol> [-l<frame_length> -s<rate>]&	This command starts a test server in the background. In this mode, the test server detaches from your console and does not display any output. To get information about the test server started in the background, use the **ps x** command. To safely stop the test server running in the background, use the HUP signal (**kill -HUP process_number** or **killall -HUP tty_test**).

Parameters for the tty_test in server mode

Parameter	Level	Description	
tty_nr	Mandatory	Dialogic® Diva® TTY number that should be used by this test server. It should range between 1 and N, where N is the sum of B-channels of the Dialogic® Diva® Media Boards installed in the system	
protocol	Mandatory	**Value**	**Description**
		auto	Automatic detection of the B-channel protocol stack.
		x75	HDLC/X.75/Transparent. This protocol stack provides reliable data transfer. V.42bis compression is detected automatically.
		x75v42	HDLC/X.75 with V.42bis data compression/Transparent. This protocol is not used on the server side because *x75* automatically detects X.75 with V.42bis.
		v120	HDLC/V.120/Transparent V.120 with V.42bis is possible.
		v110	V.110/Transparent/Transparent
		mdm	Modem with full negotiation/V.42+V.42bis/Transparent.

-l<frame_length>	Optional	Length of the test frame. It is normally not used by the test server but it should be provided if the *-s* option follows
-s<rate>	Optional	Speed adaptation rate. This parameter should be indicated if the *v110* B-channel protocol is used without auto detection. It should range between 2 and 9 (5-9600, 9-56000). If this option is selected, the "-l" option should also be used

tty_test in client mode

The test client can be started with the following commands:

Command	Description
tty_test <tty_nr> <CPN> <protocol> [-l<frame_length> -s<rate>] [-a<at_command>] [-y] [-m<packets>]	This command starts a test client on your console.
tty_test <tty_nr> <CPN> <protocol> [-l<frame_length> -s<rate>] [-a<at_command>] [-mpackets] -x&	This command starts a test client in the background. In this mode, the test client detaches from your console and does not display any output. It generates a file named `log.<tty_nr>` in its working directory. The test client reports its link statistics to this file. You can monitor the link statistics by the command **strings log.* | more**.

Note: The tty_test updates the log files after 64 KBytes of data have been transferred. Therefore, please be patient if you use, e.g., the V.110 protocol with 9600 bps.

To get information about the test client started in the background, type: **ps ax | grep tty_test**.

To safely stop the test client running in the background, use the "HUP" signal (**kill -HUP process_number** or **killall -HUP tty_test**). The **tty_test** utility understands the commands HUP, TERM, ABRT and INT. These commands terminate the **tty_test** utility.

Parameters for the tty_test in client mode

Parameter	Level	Description	
tty_nr	Mandatory	Dialogic® Diva® TTY number that should be used by this test server. It should range between 1 and N, where N is the sum of B-channels of the Dialogic® Diva® Media Board installed in the system.	
CPN	Mandatory	Called Party Number (any number can be used in back-to-back mode)	
protocol	Mandatory	**Value**	**Description**
		hdlc	HDLC/Transparent/Transparent. This protocol stack is widely used by RAS.
		x75	HDLC/X.75/Transparent. This protocol stack provides reliable data transfer. V.42bis compression is detected automatically.

		x75v42	HDLC/X.75 with V.42bis data compression/Transparent. This protocol is not used on the server side because *x75* automatically detects X.75 with V.42bis.
		v120	HDLC/V.120/Transparent V.120 with V.42bis is possible.
		v110	V.110/Transparent/Transparent
		mdm	Modem with full negotiation/V.42+V.42bis/Transparent.

-l<frame_length>	Optional	Length of the test frame. It is normally not used by the test server but it should be provided if the *-s* option follows
-s<rate>	Optional	Speed adaptation rate. This parameter should be indicated if the *v110* B-channel protocol is used without auto detection. It should range between 2 and 9 (5-9600, 9-56000). If this option is selected, the "-l" option should also be used.
-a<at_command>	Optional	Allows to provide additional AT-command strings used for client initialization.
-y	Optional	Does not display any messages except call progress and data transfer status.
-m<packets>	Optional	Exits after "packets" data packets were sent. Displays the transfer status on the screen (standard out) and prints it to the `log.<tty_nr>` file. Error messages generated at dial time are additionally written to syslog. If the data packets have been successfully transferred, exit status is 20. Any other exit status indicates an error. This option allows you to create scripts that provide tests for multiple calls with different protocols.

Example 2. Start tty_test server with protocol auto-detection

To start the test server at TTY number 10 and use protocol auto-detection execute: **tty_test 10 s auto**.

Example 3. Start the test server using the V.110 protocol

To start the test server at TTY number 21 using the V.110 protocol with 9600 bps in the background execute: **tty_test 21 sv v110 -l2048 -s5&**

Example 4. Start the test client using the X.75 protocol and specify the frame length

To start the test client at TTY 1 using the X.75 protocol, the called party number 800, and a test frame length of 514 bytes, execute: **tty_test 1 800 x75 -l514**.

Example 5. Start the test client using the V.110 protocol

To start the test client at TTY 1 running in the background using the V.110 protocol, called party number 800, a test frame length of 128 bytes, a rate adaptation speed of 9600 bps, and rate adaptation indication in the bearer capabilities, execute: **tty_test 1 800 v110 -l128 -s5 -a+iu="<8890214800bb>" -x&**

Example 6. Start 30 test server and 30 test client sessions

Start 30 test server and 30 test client sessions using this sample shell script. It uses B-channel protocol auto-detection on the server side and V.110 with 9600 bps on the client side.

```
#! /bin/sh
#This "n_cons" value will start 30 server and 30 client sessions
n_cons=30
# remove old log files
rm -f log.*
while [ $((n_cons)) -ge 1 ]
do
echo "Start $(($n_cons+30)) -> $((n_cons))"
/usr/lib/opendiva/divas/tty_test $((n_cons)) sv auto&
sleep 1
/usr/lib/opendiva/divas/tty_test $(($n_cons+30)) 800 v110 -l512 -a+ib5+iu="<8890214800bb>" -x&
sleep 1
n_cons=$(($n_cons-1))
done
#
# Note that tty_test updates log files after 64 KBytes
# of data have been transferred. Also, please be patient if you
# use v110 with 9600 bps.
# To view tty_test processes, type "ps x".
# To view the log files, use "cat log.* | more".
# ---------------------------------------------------------------
# END OF SCRIPT
# ---------------------------------------------------------------
```

tty_test in terminal mode

tty_test includes a simple and easy to use terminal mode. To start **tty_test** in terminal mode, execute: **/usr/lib/opendiva/divas/tty_test <tty_nr> t**

Parameters for the tty_test in terminal mode

Parameter	Level	Description
tty_test	Mandatory	Dialogic® Diva® TTY number that should be used by this test. It should range between 1 and N, where N is the sum of B-channels of the Dialogic® Diva® Media Boards installed in the system.

Normally, <CR> is forwarded to TTY. If you wish to strip <CR> from your input (for example to test the +++ escape operation), enter `ENTER "r" ENTER`. **tty_test** will enter the "no CR" mode and will remove <CR> from your input before data is written to TTY. You can switch back to "normal" operation by entering `ENTER "R" ENTER`. If you are in "no CR" mode, `ENTER "r" ENTER` writes a <CR> to TTY.

In terminal mode, you can view the content of the virtual modem status register if you enter ENTER `show msr` ENTER. This will issue TIOCMGET `ioctl` on the TTY interface and print its output to the terminal.

You can set or clear the DTR line in the virtual Line Control Register (LCR). If you enter `ENTER "DTR+" ENTER`, the DTR line will be set. If you enter `ENTER "DTR-" ENTER`, the DTR line will be cleared (TIOCMBIS and TIOCMBIC `ioctl` codes).

To quit the **tty_test** terminal mode, enter `ENTER "q" ENTER`.

Selection of different TTY interfaces

tty_test has been developed to test and control the Dialogic® Diva® TTY interface. It tries to open `the /dev/ttyds[01 ....`] device node. With other operating systems, the name of the Diva TTY interface may be different. You can still use tty_test without any changes if you create a symbolic link: **ln -s <your_real_tty_interface_device_node> /dev/ttydsXXX**.

Web interface

You can use the Dialogic® Diva® web interface, accessible at port *10005*, to gain access to Dialogic® Diva® Media Board and system configuration, management interfaces of the Diva Media Boards and drivers, generate statistics and reports, invoke troubleshooting procedures, create/view trace files and view/control the status of the hardware.

To access the Diva web interface you need a web browser with Java Script support. For instance to access the Diva web interface at local host, type in the address window of you browser: http://127.0.0.1:10005.

The Dialogic® Diva® HTTP server is controlled by the internet daemon and is running only during the time a request from the user is processed. This allows for saving system resources.

WEB server configuration

The Dialogic® Diva® HTTP server (diva_httpd) is started via xinetd.

The product installation procedure will modify `/etc/services` and add the "diva-cfg" entry to this file. Finally, the installation procedure will inform the internet daemon (if any running) about changes in the configuration file.

Before you can access the Diva HTTP server you need to set a password in the `/usr/lib/opendiva/divas/httpd/login/login` file. The valid password should contain not less than seven characters and being accessible only by "root".

If you generally want to disable the Diva HTTP server, you can execute **cd /usr/lib/opendiva/divas && sh ./cfg_util.sh 4** and the configuration procedure will remove the "diva- cfg" entry from the `/etc/services` file and inform the internet daemon about changes in the configuration file.

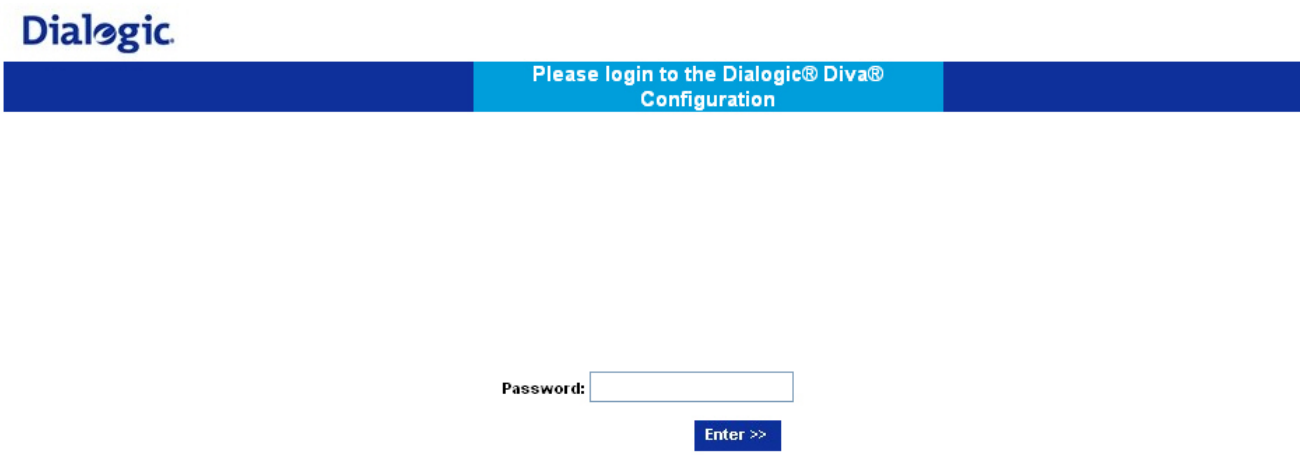
You can use ***stunnel*** http://www.stunnel.org Universal SSL tunnel to allow secure access to the Dialogic® Diva® WEB server. [19]

The **stunnel** is designed to work as SSL encryption wrapper between remote clients and local (xinetd-startable) or remove servers. The concept is to have non-SSL aware daemons running on your system. You can easily set them up to communicate with clients over secure SSL channels.

To access the Diva HTTP server at a different port, you need to change the port number associated with the "diva- cfg" entry in the `/etc/services` file and restart the internet daemon.

Login procedure

After the first access to the Dialogic® Diva® HTTP server, the login page appears:



After a successful login, the Diva HTTP server verifies the "Java Script" functionality. If the WEB browser cannot provide the requested functionality, a WEB page appears informing you about the cause of the failure.

If your browser provides the requested features, the Diva HTTP server forwards you to ***the Main*** page on page 104.

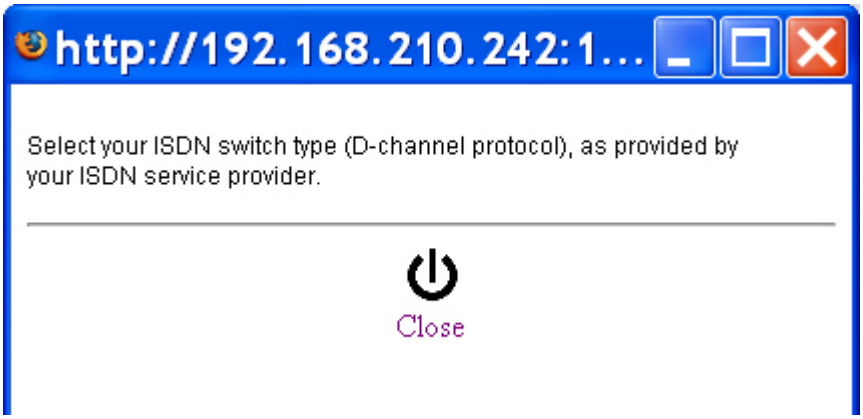
The server will automatically log you off after 15 minutes of inactivity.

You can log off using the following link:

Context sensitive help

The names of most configuration parameters and commands, accessible via the Dialogic® Diva® WEB server, are exposed as HTTP links (HTML links are underlined and the mouse cursor changes its form if you move it over the link). If you click the link, a page appears with help for this parameter. For instance if you click

the following help window appears:



Dialogic home page

Click the Dialogic symbol to access the Dialogic home page.

Reference Guide

REFERENCE GUIDES

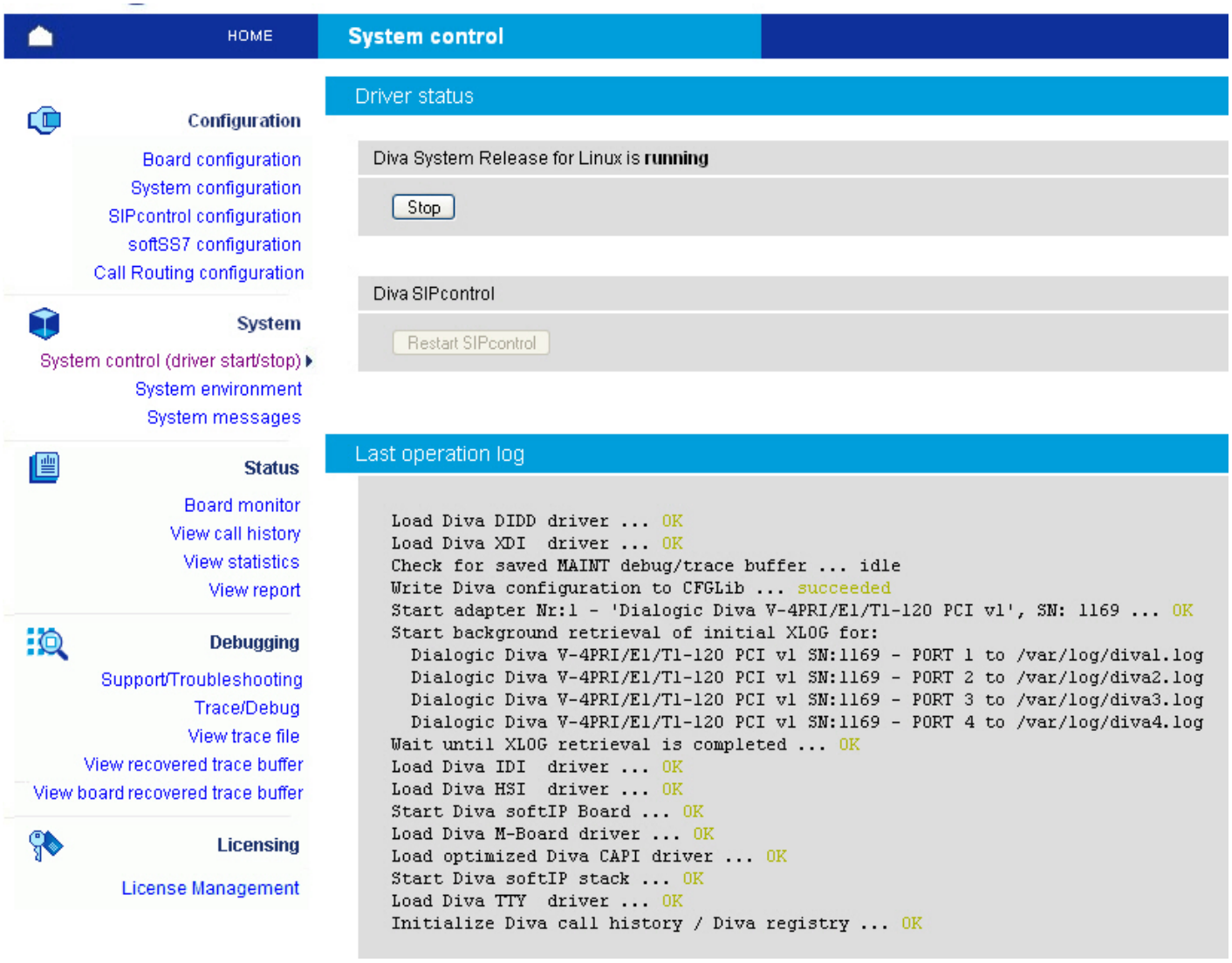
Click **Reference Guides** in the upper right corner to open the drop-down menu with the list of the available documentation. Click the reference guide you want to consult and it will open in a separate window.

Main page

After the successful ***Login procedure*** on page 102 the Dialogic® Diva® WEB server presents you the main page:

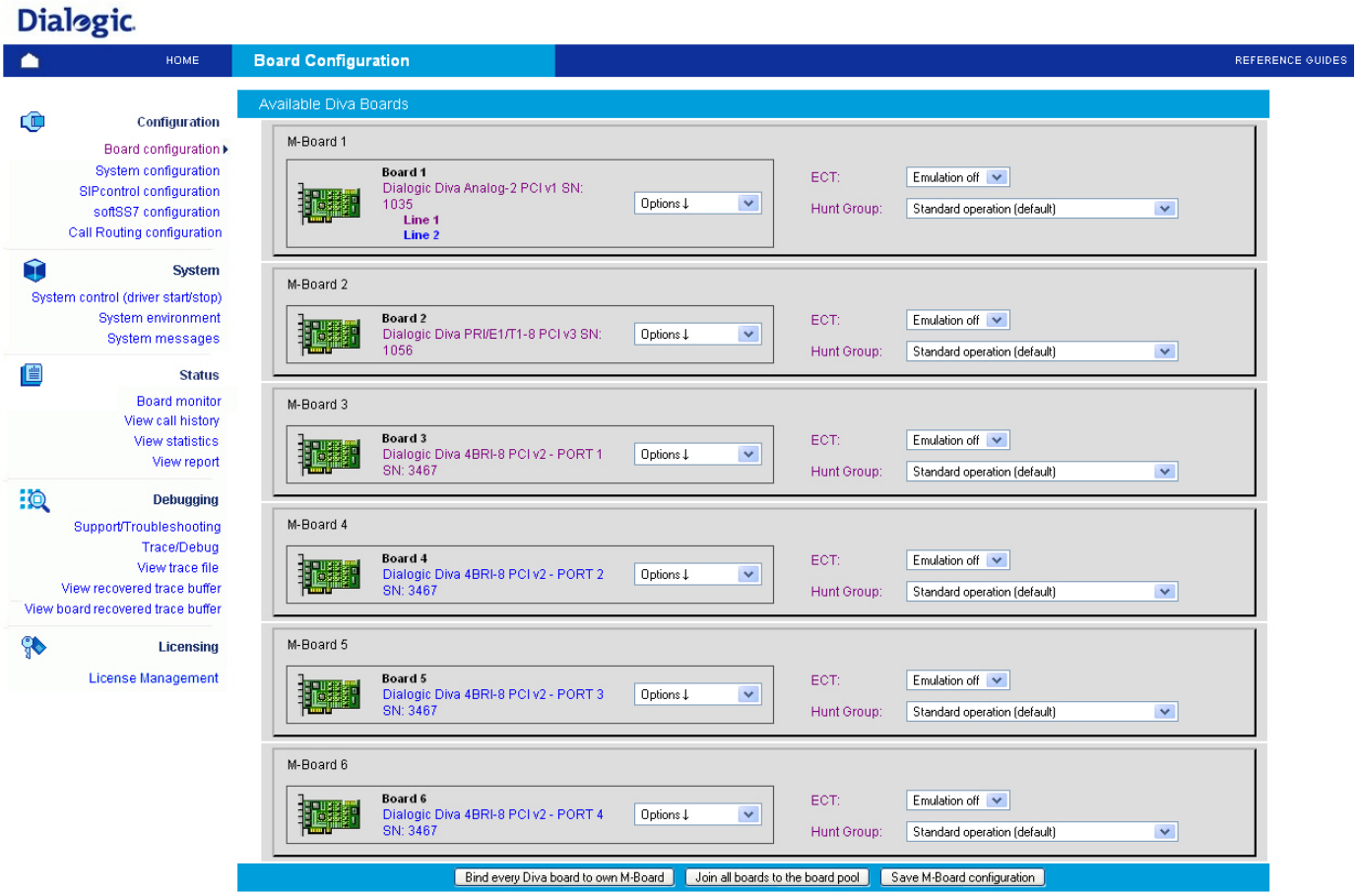
System control (driver start/stop)

If you click **System control (driver start/stop)** the following page opens, where you can start and to stop Dialogic® Diva® drivers. The Dialogic® Diva® WEB server will detect the current state of the drivers and opens you the appropriate page. Moreover, this page allows you to view the log file of the last driver start/stop configuration procedure.


HOME
System control
Configuration
Board configuration
System configuration
SIPcontrol configuration
softSS7 configuration
Call Routing configuration
System
System control (driver start/stop)
System environment
System messages
Status
Board monitor
View call history
View statistics
View report
Debugging
Support/Troubleshooting
Trace/Debug
View trace file
View recovered trace buffer
View board recovered trace buffer
Licensing
License Management
Driver status
Diva System Release for Linux is running
Stop
Diva SIPcontrol
Restart SIPcontrol
Last operation log
Load Diva DIDD driver ... OK
Load Diva XDI driver ... OK
Check for saved MAINT debug/trace buffer ... idle
Write Diva configuration to CFGLib ... succeeded
Start adapter Nr:1 - 'Dialogic Diva V-4PRI/E1/T1-120 PCI v1', SN: 1169 ... OK
Start background retrieval of initial XLOG for:
Dialogic Diva V-4PRI/E1/T1-120 PCI v1 SN:1169 - PORT 1 to /var/log/diva1.log
Dialogic Diva V-4PRI/E1/T1-120 PCI v1 SN:1169 - PORT 2 to /var/log/diva2.log
Dialogic Diva V-4PRI/E1/T1-120 PCI v1 SN:1169 - PORT 3 to /var/log/diva3.log
Dialogic Diva V-4PRI/E1/T1-120 PCI v1 SN:1169 - PORT 4 to /var/log/diva4.log
Wait until XLOG retrieval is completed ... OK
Load Diva IDI driver ... OK
Load Diva HSI driver ... OK
Start Diva softIP Board ... OK
Load Diva M-Board driver ... OK
Load optimized Diva CAPI driver ... OK
Start Diva softIP stack ... OK
Load Diva TTY driver ... OK
Initialize Diva call history / Diva registry ... OK

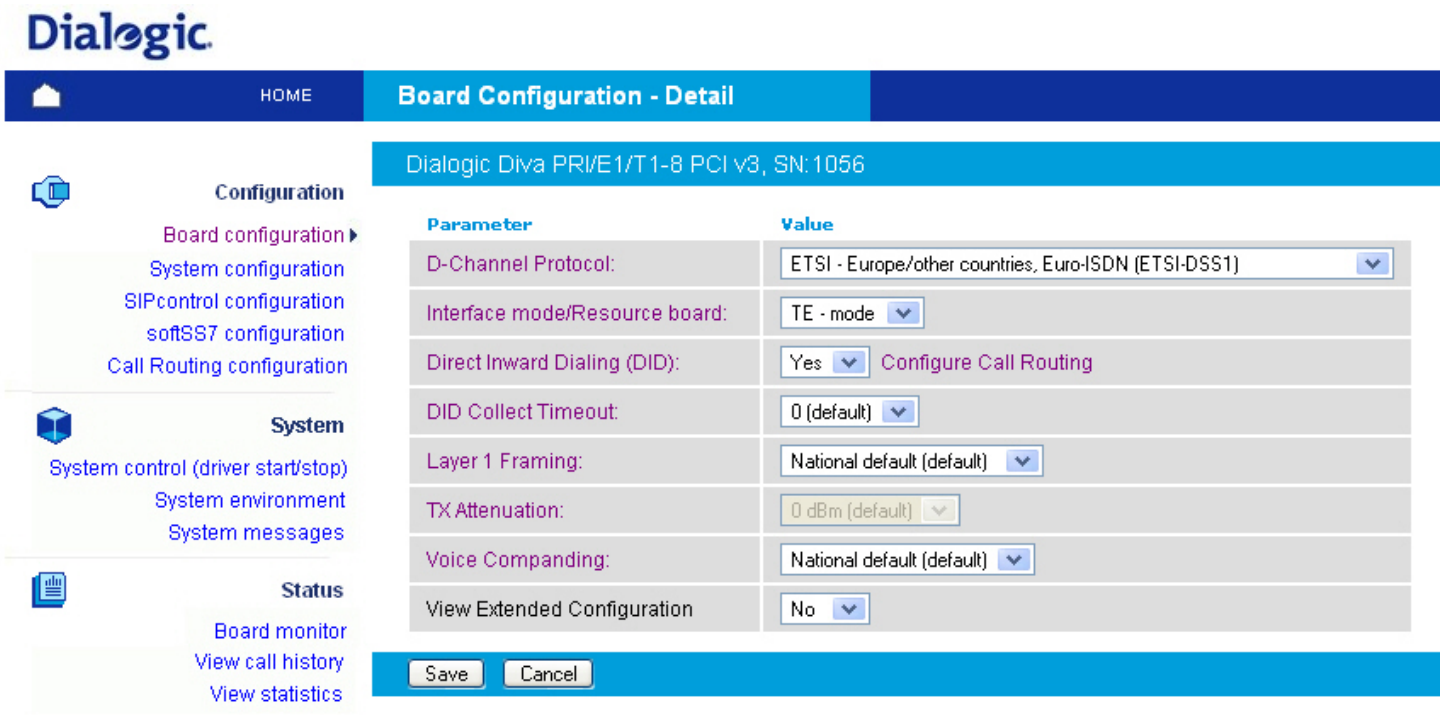
Board configuration

If you click **Board configuration** on the left side, the following page opens, which allows you to create/change the configuration of the Dialogic® Diva® Media Boards, to restart or disable the selected Diva Media Board if necessary, and to start the Diva Media Board identification process. You can also configure the M-Board:



Use the **Restart** symbol to restart. In the drop-down menu on the right of the Diva Media Board description you can select different options:

- Select **Configuration** to start the configuration of the selected Diva Media Board and a screen similar to the one shown below is displayed.
- When you select **Indentify on**, the LEDs of the Diva Media Board are set to blink so that you can simply identify the board for connecting it to the correct cable.
- When you select **Disable hardware**, the Diva Media Board is unloaded from the system and layer 1 gets disconnected.
- You can also select the M-Board the Diva Media Board should be added to.

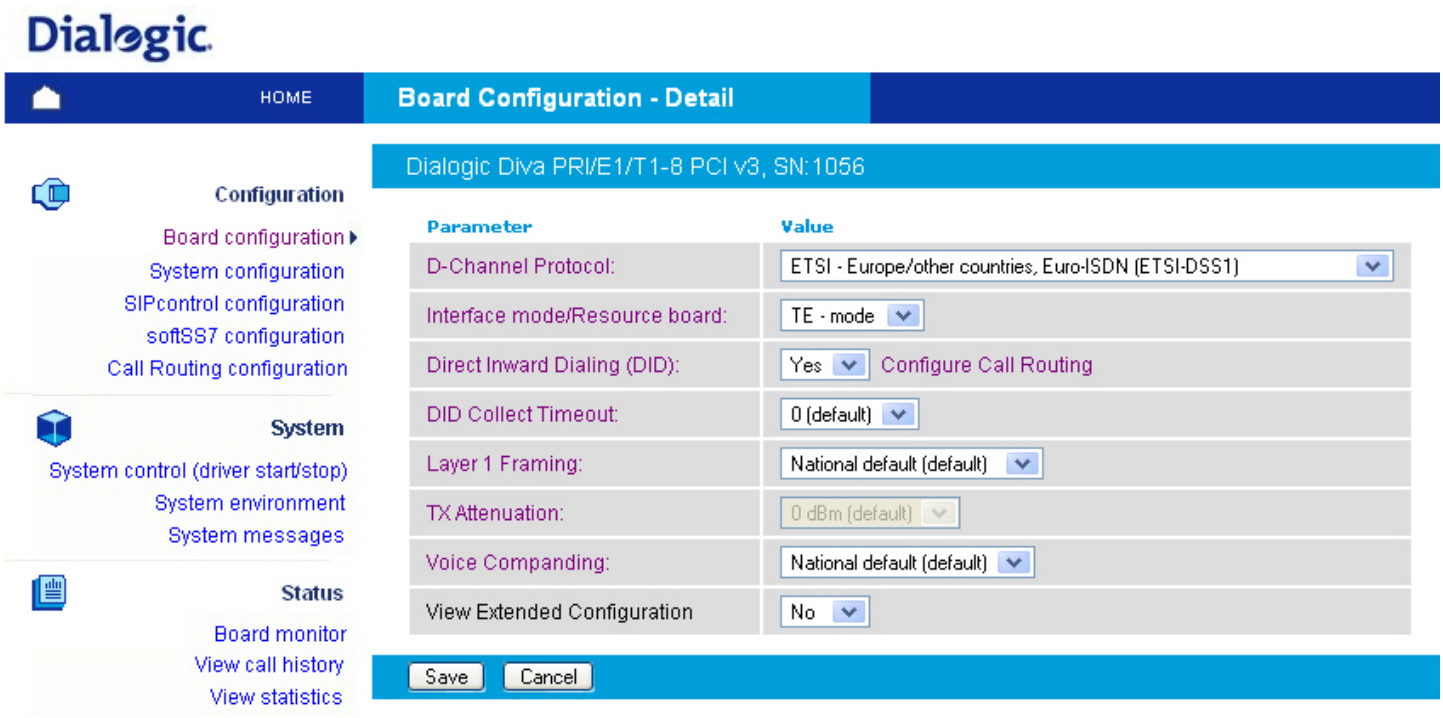


As soon as the configuration process is complete, click **Save** to update the Diva Media Board configuration. The Diva Media Board configuration utility tries to update the changed configuration parameters on demand, i.e., without board restart. If the changed parameters cannot be updated in this way, the Dialogic® Diva® WEB server will ask you to restart the Diva Media Board.

System configuration

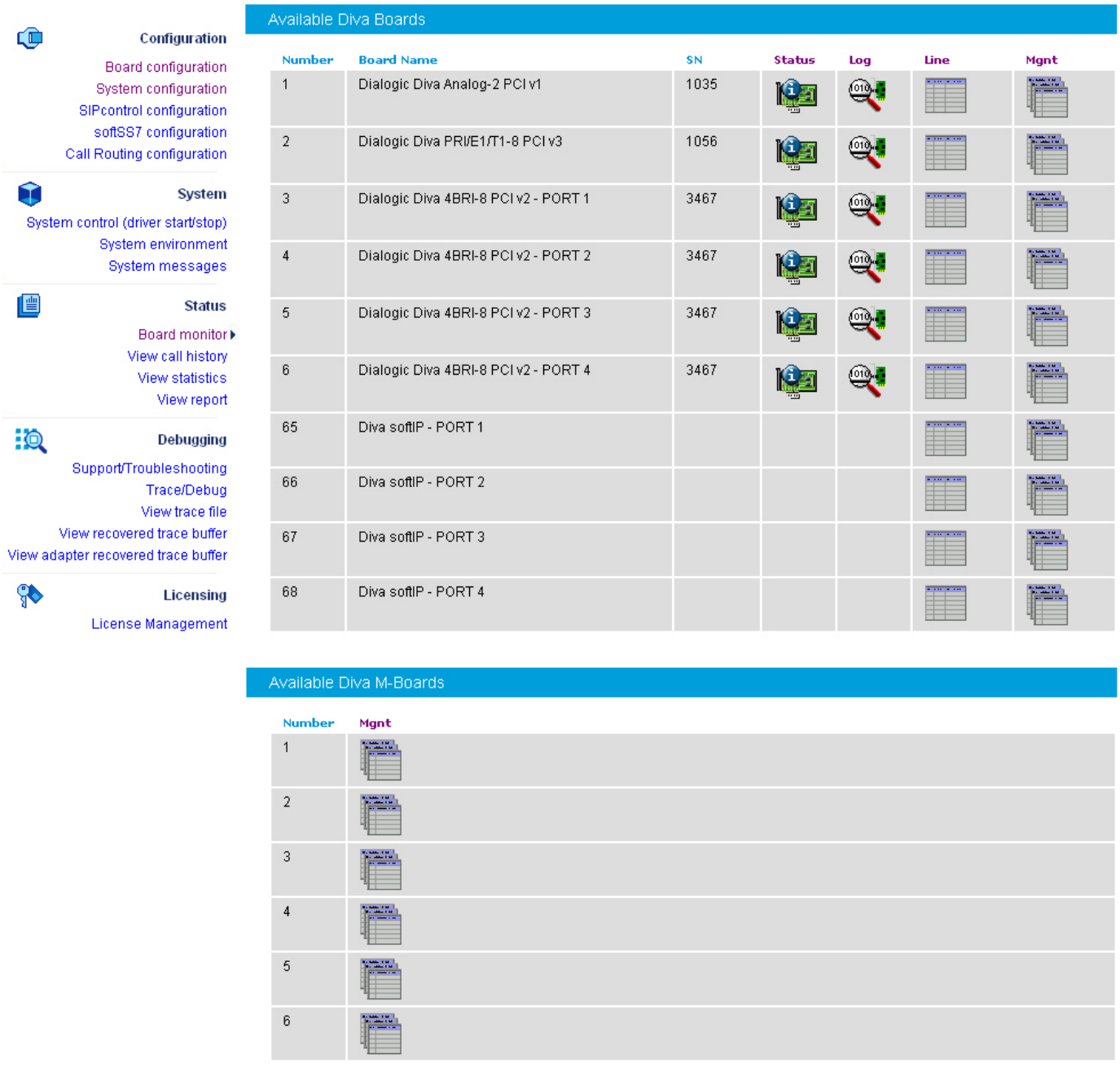
If you click **System configuration** on the left hand side, a page opens that allows you to configure global system parameters that affect the installed boards and device drivers, to optimize the configuration of your system, such as fax-, RAS, or Voice serve, to select the applications and interface drivers to be loaded (CAPI, TTY), and to control misc. system services (accounting, etc.).

Note: The activation of the SIP-PSTN gateway (Dialogic® Diva® SIPcontrol™ 1.6 software), the SIP enabled CAPI (softIP 2.2), the ITU-T SS7 support (softSS7 1.5.2), or specific features on the Dialogic® Diva® Media Boards requires a valid license. Please contact your local sales representative for more information.



Board monitor

If you click **Board monitor** on the left hand side the following page opens, which allows you to control the current status and the configuration of the installed Dialogic® Diva® Media Boards, to read internal board trace buffers (XLOG) and to gain access to the ***Management interface*** on page 73 of Diva Media Boards and drivers:



Management interface browser

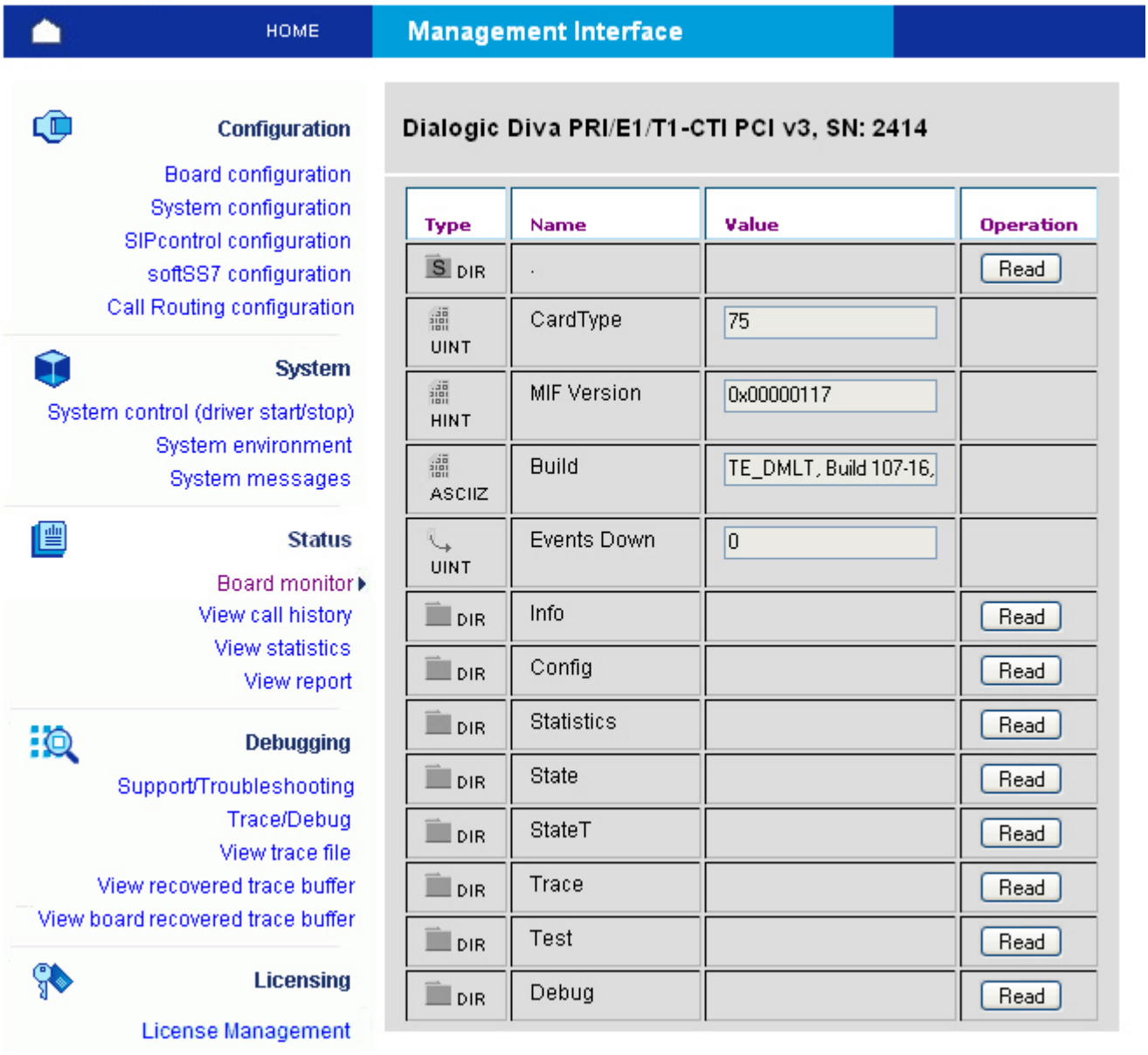
You can navigate through the ***Management interface*** on page 73 of the selected Dialogic® Diva® Media Board or driver using the management interface browser:

The management interface is available for:

- ***Dialogic® Diva® Media Boards*** see "Dialogic® Diva® Media Board management interface" on page 111
- ***the Dialogic® Diva® TTY driver*** see "Dialogic® Diva® TTY driver management interface" on page 113
- ***the CAPI driver*** see "CAPI driver management interface" on page 112

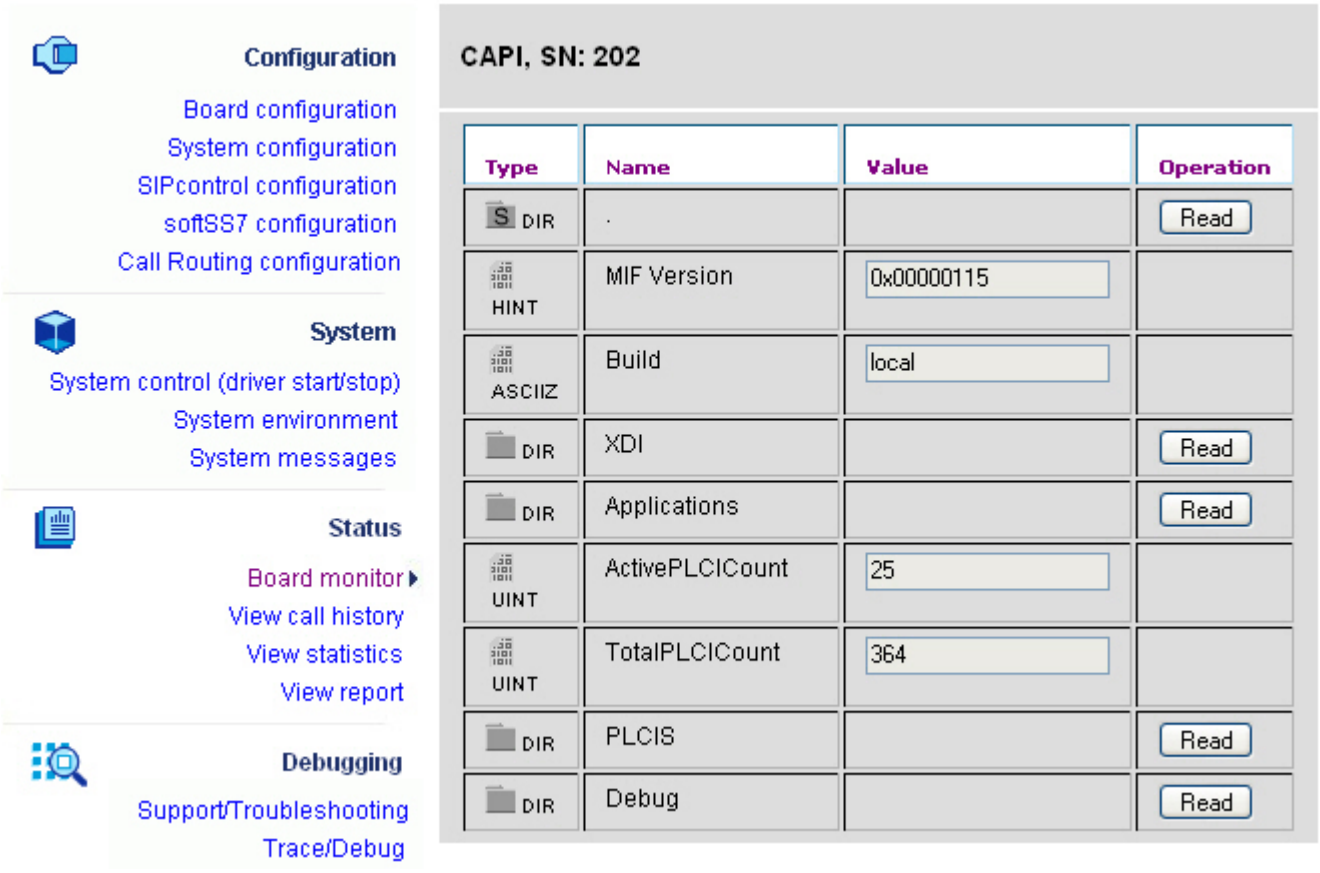
Dialogic® Diva® Media Board management interface

If you click the icon below **Mgnt** in the **Available Diva Board** section, the management interface browser opens. The management interface browser allows you to navigate through the management interface directories, read, write, and execute management interface variables using the buttons under **Operation**.



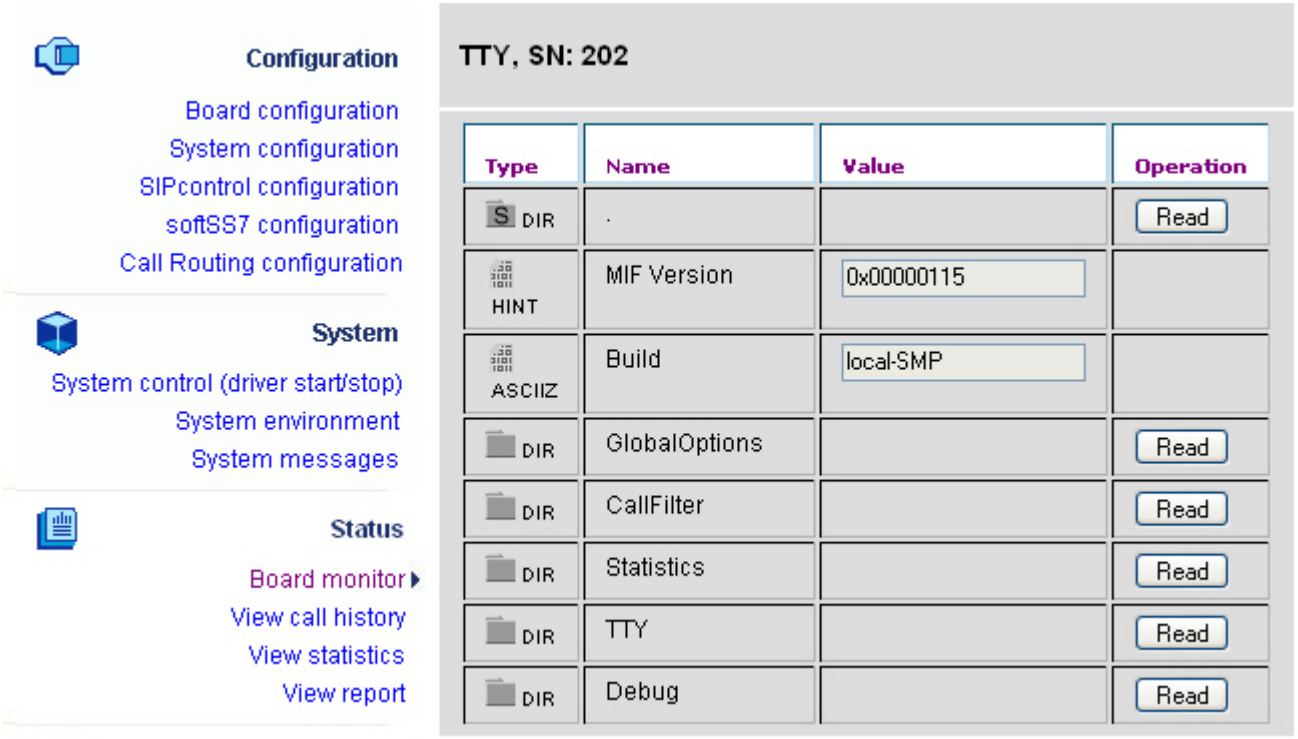
CAPI driver management interface

If you click the icon below **Mgnt** for the CAPI driver in the **Available System Release driver** section, the management interface browser opens. The management interface browser allows you to navigate through the management interface directories, read, write, and execute management interface variables using the buttons under **Operation**.

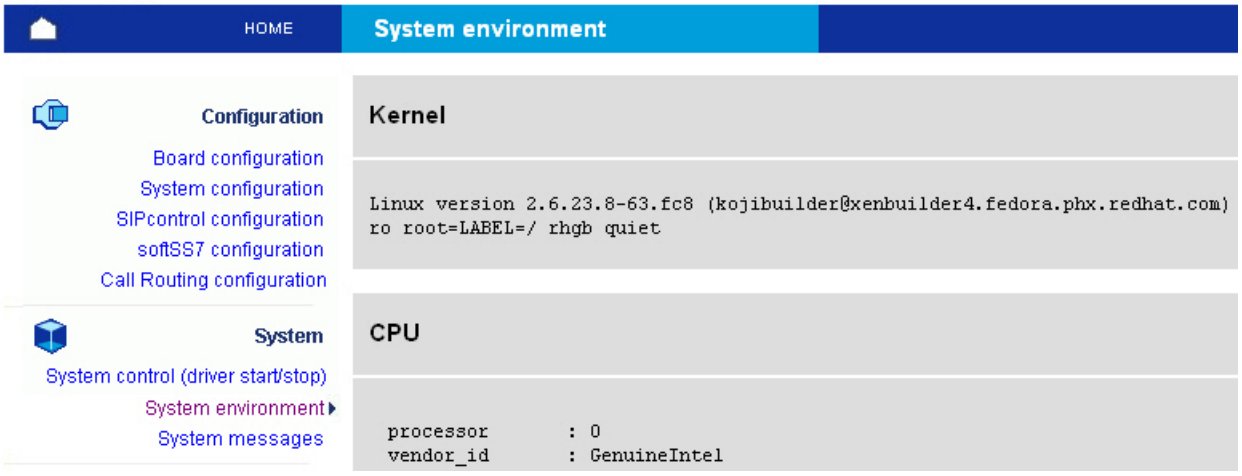


Dialogic® Diva® TTY driver management interface

If you click the icon below **Mgnt** for the TTY driver in the **Available System Release driver** section, the management interface browser opens. The management interface browser allows you to navigate through the management interface directories, read, write, and execute management interface variables using the buttons under **Operation**.



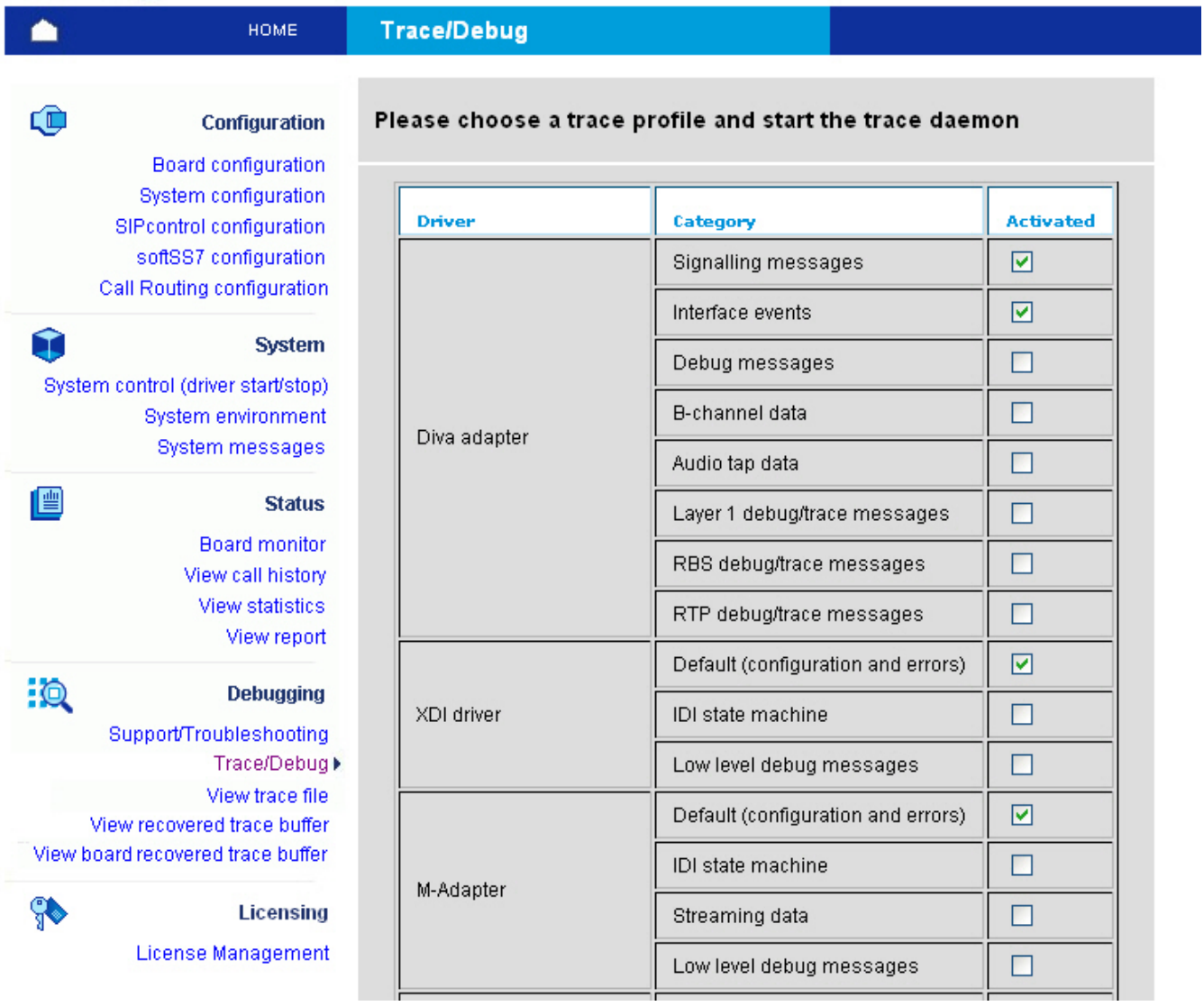
System environment

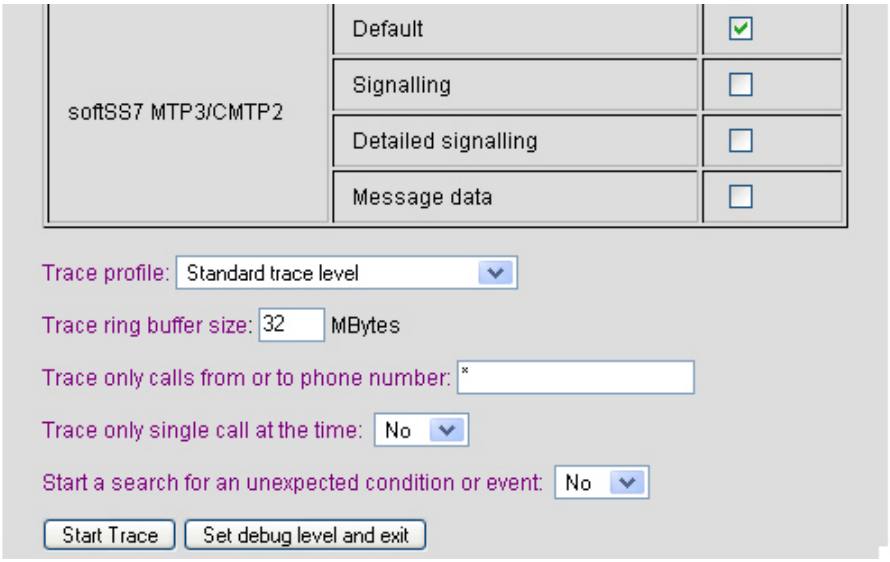


This page allows you to get important information about your system (kernel version, PCI hardware configuration, system resources, etc.). Most of the information is retrieved from the `/proc` file system.

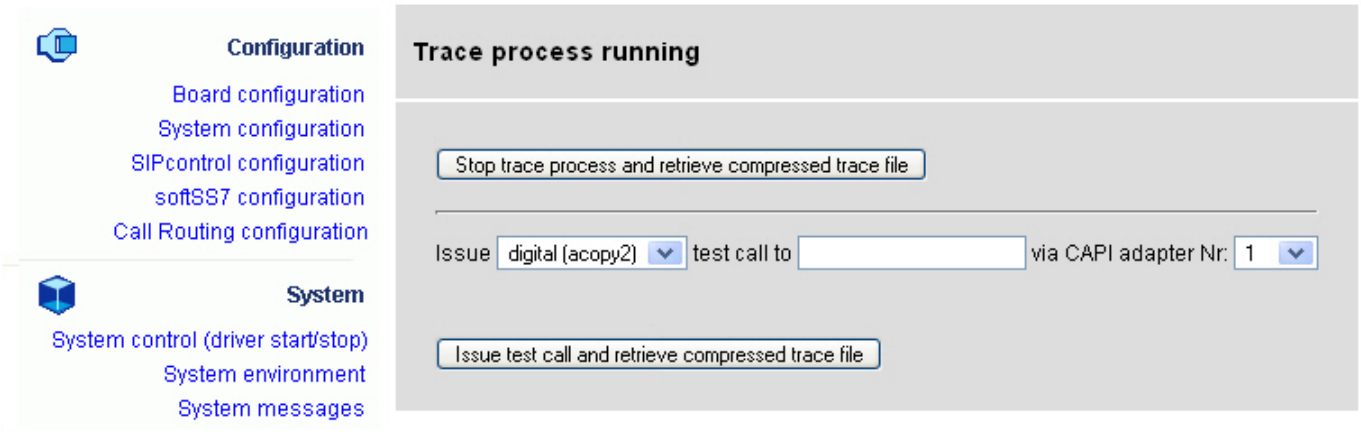
Trace/Debug

This page allows you to select the trace profile and level, to set trace ring buffer size and to activate the background trace process:




softSS7 MTP3/CMTP2
Default
Signalling
Detailed signalling
Message data
Trace profile: Standard trace level
Trace ring buffer size: 32 MBytes
Trace only calls from or to phone number:
Trace only single call at the time: No
Start a search for an unexpected condition or event: No
Start Trace
Set debug level and exit

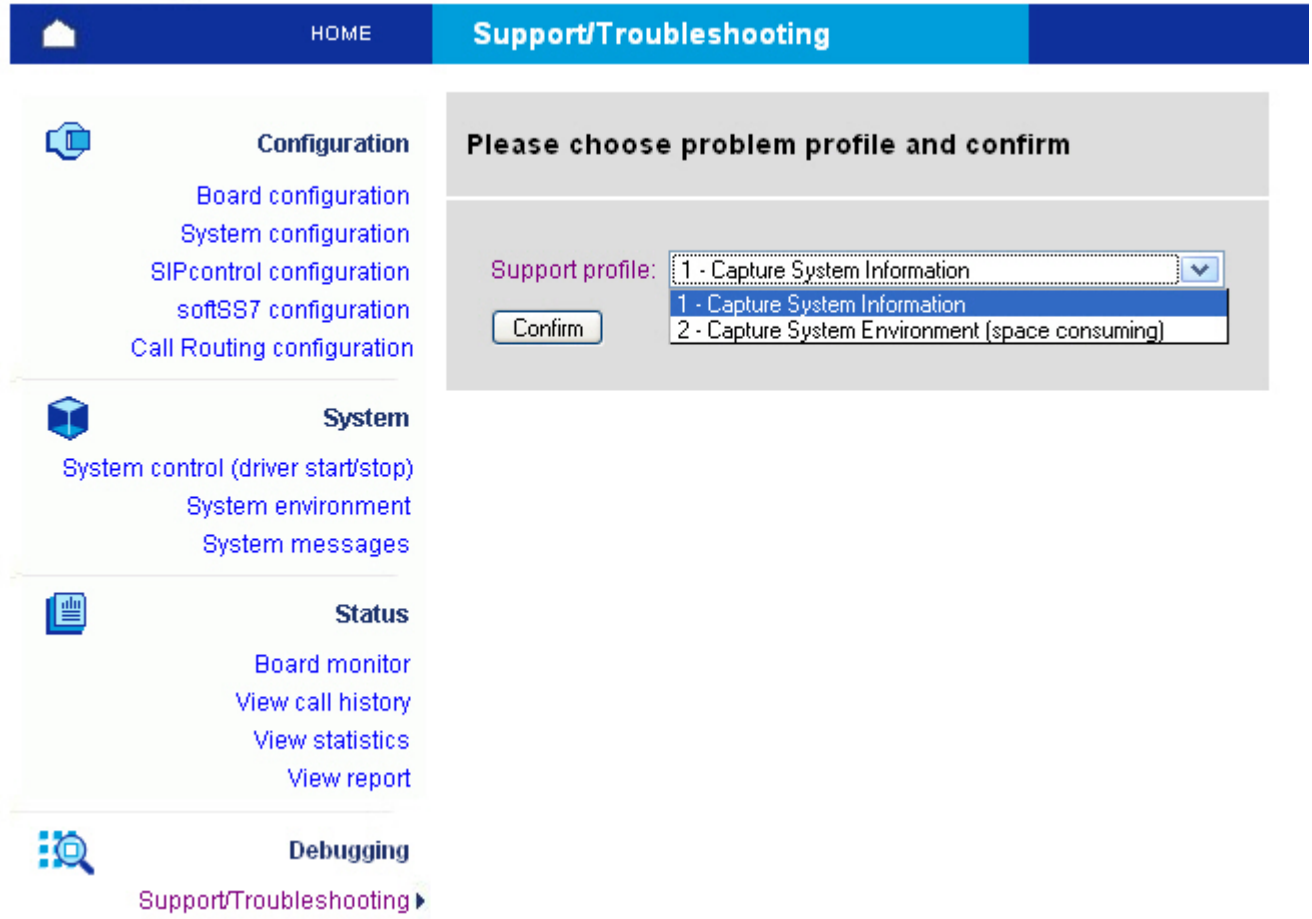
Once the trace process (ditrace) is running you can issue one test call or stop the trace process and retrieve compressed trace file.



At any time you can view the context of the trace ring buffer file (even if the trace process is still running) using the trace file viewer. See ***View trace file*** on page 118 for more information.

Support/Troubleshooting

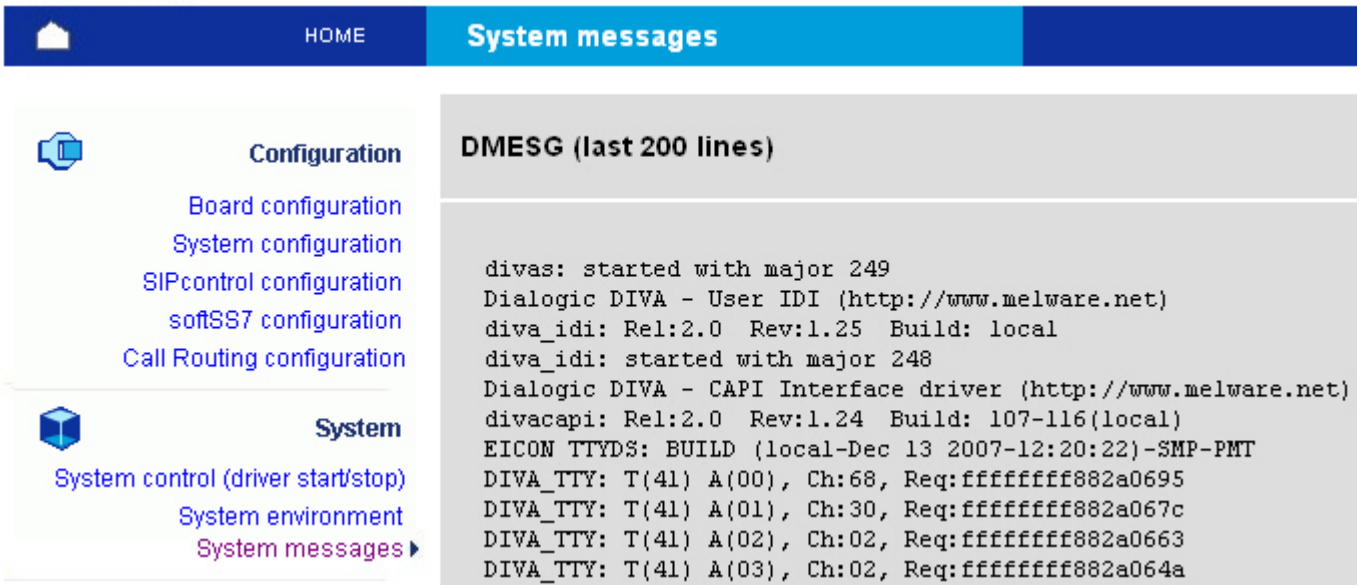
In case of a problem you can use this page to capture relevant information for your support request:



You can invoke the support procedure in two modes: The first mode captures the most important information about your system in one text file, whereas the second mode captures system environment information (kernel image, modules, configuration files) that allows the Dialogic Customer Support personnel to reproduce your environment locally. Finally, you can download the report file as compressed archive.

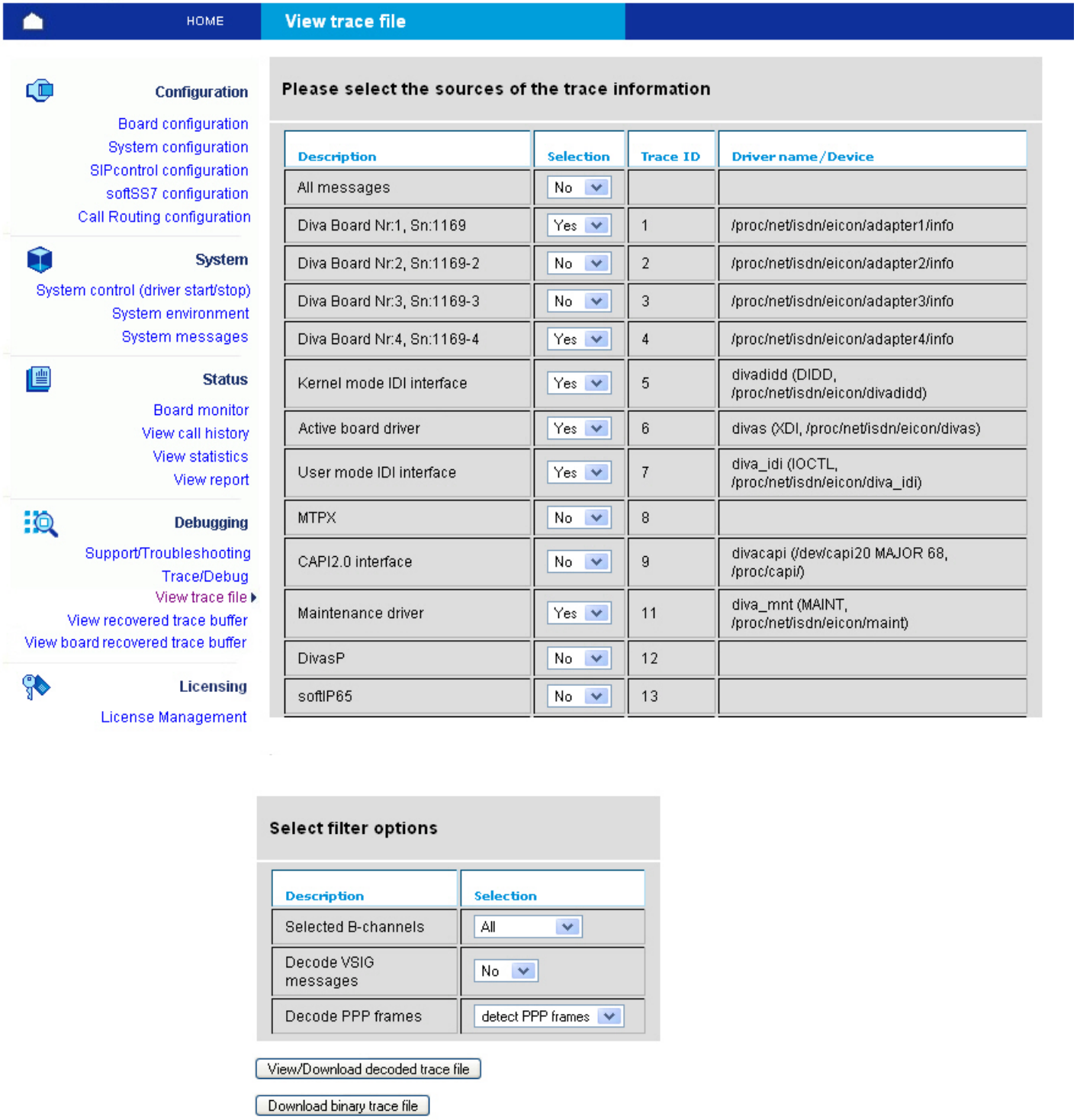
System messages

This page allows you to view the last 200 messages from the kernel ring buffer. This is equivalent to the command **dmesg > msg.txt && tail -n 200 msg.txt**

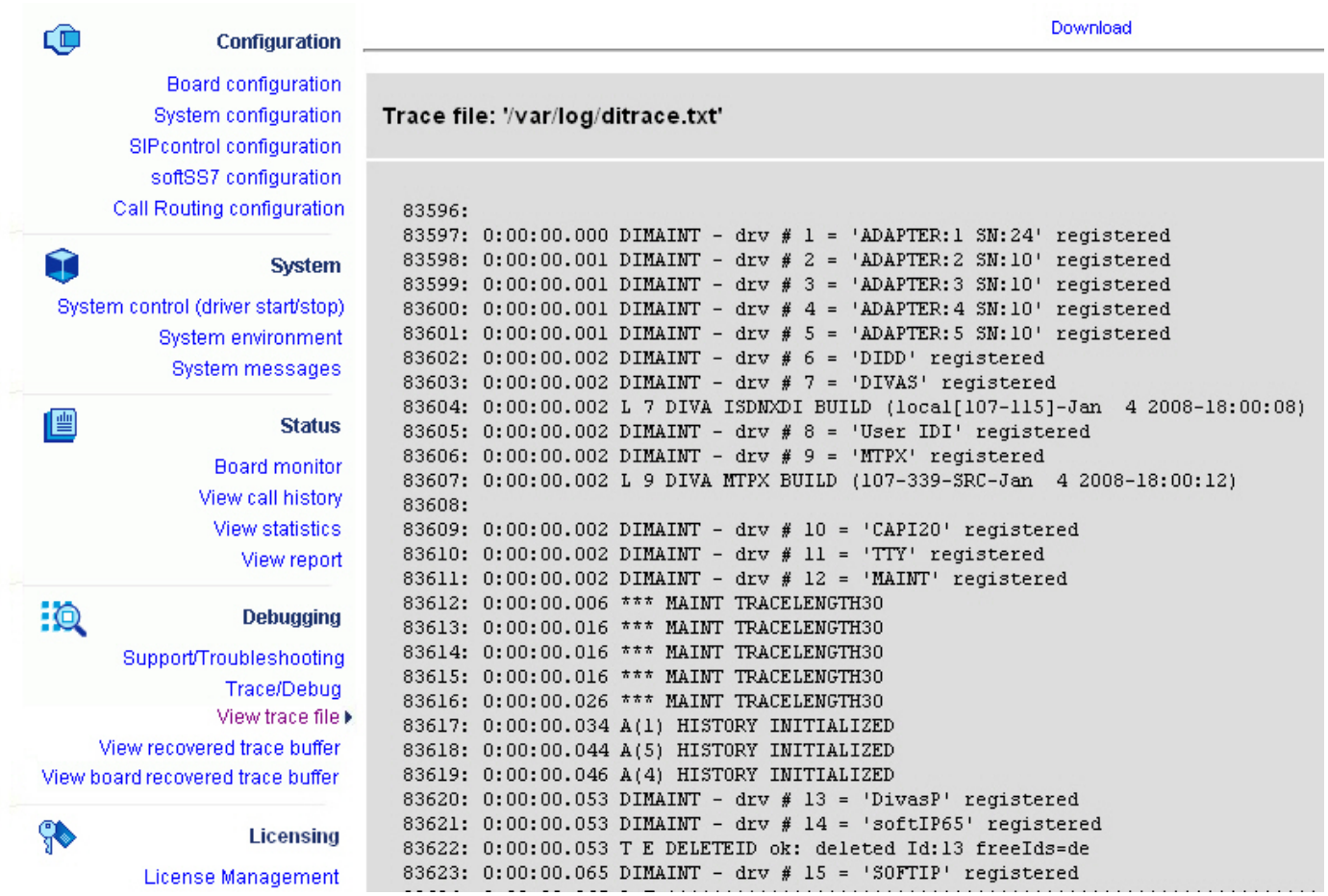


View trace file

This page allows you to decode and to view a trace file. You can filter the trace file to view only specific sources of the information:



Finally, you can view or download the decoded trace file:


Configuration
Board configuration
System configuration
SIPcontrol configuration
softSS7 configuration
Call Routing configuration
System
System control (driver start/stop)
System environment
System messages
Status
Board monitor
View call history
View statistics
View report
Debugging
Support/Troubleshooting
Trace/Debug
View trace file
View recovered trace buffer
View board recovered trace buffer
Licensing
License Management
Download
Trace file: '/var/log/ditrace.txt'
83596:
83597: 0:00:00.000 DIMAINT - drv # 1 = 'ADAPTER:1 SN:24' registered
83598: 0:00:00.001 DIMAINT - drv # 2 = 'ADAPTER:2 SN:10' registered
83599: 0:00:00.001 DIMAINT - drv # 3 = 'ADAPTER:3 SN:10' registered
83600: 0:00:00.001 DIMAINT - drv # 4 = 'ADAPTER:4 SN:10' registered
83601: 0:00:00.001 DIMAINT - drv # 5 = 'ADAPTER:5 SN:10' registered
83602: 0:00:00.002 DIMAINT - drv # 6 = 'DIDD' registered
83603: 0:00:00.002 DIMAINT - drv # 7 = 'DIVAS' registered
83604: 0:00:00.002 L 7 DIVA ISDNXDI BUILD (local[107-115]-Jan 4 2008-18:00:08)
83605: 0:00:00.002 DIMAINT - drv # 8 = 'User IDI' registered
83606: 0:00:00.002 DIMAINT - drv # 9 = 'MTPX' registered
83607: 0:00:00.002 L 9 DIVA MTPX BUILD (107-339-SRC-Jan 4 2008-18:00:12)
83608:
83609: 0:00:00.002 DIMAINT - drv # 10 = 'CAPI20' registered
83610: 0:00:00.002 DIMAINT - drv # 11 = 'TTY' registered
83611: 0:00:00.002 DIMAINT - drv # 12 = 'MAINT' registered
83612: 0:00:00.006 *** MAINT TRACELENGTH30
83613: 0:00:00.016 *** MAINT TRACELENGTH30
83614: 0:00:00.016 *** MAINT TRACELENGTH30
83615: 0:00:00.016 *** MAINT TRACELENGTH30
83616: 0:00:00.026 *** MAINT TRACELENGTH30
83617: 0:00:00.034 A(1) HISTORY INITIALIZED
83618: 0:00:00.044 A(5) HISTORY INITIALIZED
83619: 0:00:00.046 A(4) HISTORY INITIALIZED
83620: 0:00:00.053 DIMAINT - drv # 13 = 'DivasP' registered
83621: 0:00:00.053 DIMAINT - drv # 14 = 'softIP65' registered
83622: 0:00:00.053 T E DELETEID ok: deleted Id:13 freeIds=de
83623: 0:00:00.065 DIMAINT - drv # 15 = 'SOFTIP' registered

Orange and green trace messages deal with the call establishment.

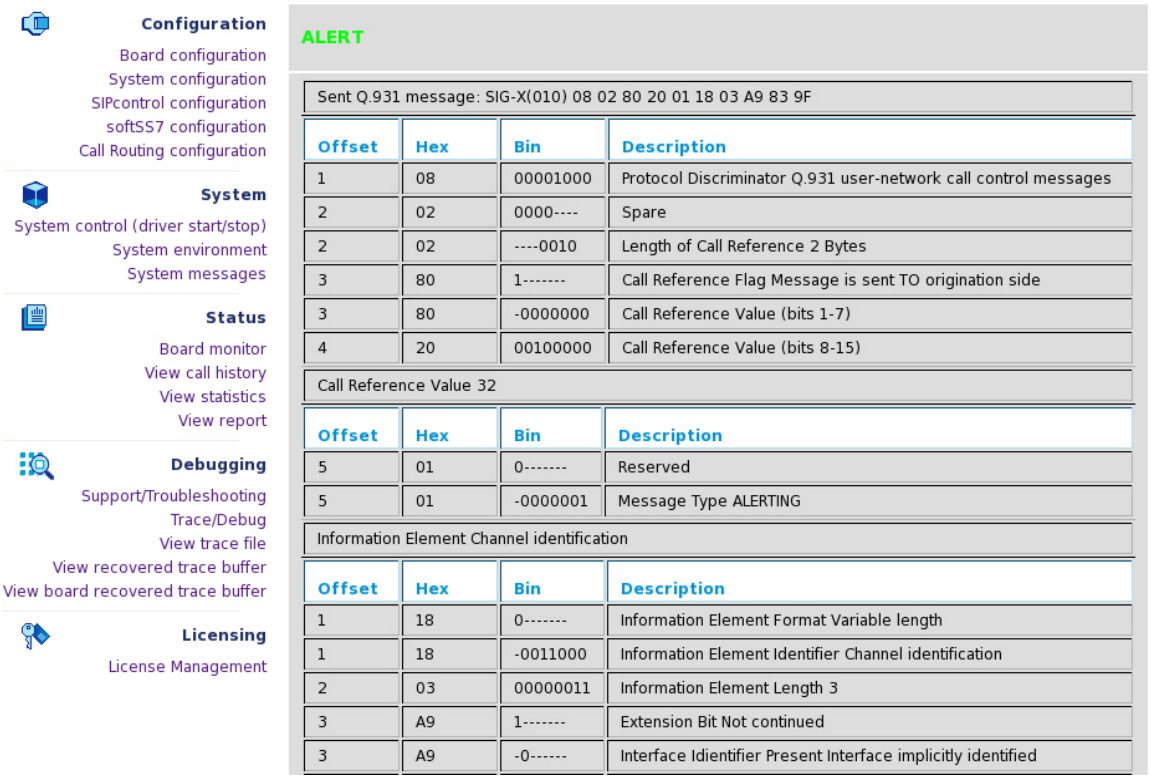
```
296376: 0:00:03.047 - 1 SIG-X(028) 08 02 00 2A 05 A1 04 03 80 90 A3 18 03 A1 83 9F 1E 02 80 83 70 06 80 30 31 30 37 32
296377:                     Q.931  CR002a SETUP
296378:                            Sending complete
296379:                            Bearer Capability 80 90 a3
296380:                            Channel Id a1 83 9f
296381:                            Progress Indicator 80 83
296382:                            Called Party Number 80 '01072'
296383: 0:00:03.047 - 2 SIG-X(028) 08 02 00 74 05 A1 04 03 80 90 A3 18 03 A1 83 9F 1E 02 80 83 70 06 80 30 31 30 37 34
296384:                     Q.931  CR0074 SETUP
296385:                            Sending complete
296386:                            Bearer Capability 80 90 a3
296387:                            Channel Id a1 83 9f
296388:                            Progress Indicator 80 83
296389:                            Called Party Number 80 '01074'
296390: 0:00:03.047 - 1 D-X(032) 02 01 6A 6A 08 02 00 2A 05 A1 04 03 80 90 A3 18 03 A1 83 9F 1E 02 80 83 70 06 80 30 31 30 cont
296391: 0:00:03.048 - 2 D-X(032) 02 01 62 62 08 02 00 74 05 A1 04 03 80 90 A3 18 03 A1 83 9F 1E 02 80 83 70 06 80 30 31 30 cont
296392: 0:00:03.053 - 1 D-R(004) 02 01 01 6C
296393: 0:00:03.054 - 2 D-R(004) 02 01 01 64
296394: 0:00:03.057 - 1 D-R(014) 00 01 6A 6C 08 02 80 2A 02 18 03 A9 83 9F
296395: 0:00:03.057 - 1 D-X(004) 00 01 01 6C
296396: 0:00:03.058 - 2 D-R(014) 00 01 62 64 08 02 80 74 02 18 03 A9 83 9F
296397: 0:00:03.058 - 2 D-X(004) 00 01 01 64
296398: 0:00:03.059 - 1 SIG-R(010) 08 02 80 2A 02 18 03 A9 83 9F
296399:                     Q.931  CR802a CALL_PROC
296400:                            Channel Id a9 83 9f
296401: 0:00:03.059 - 2 SIG-R(010) 08 02 80 74 02 18 03 A9 83 9F
296402:                     Q.931  CR8074 CALL_PROC
296403:                            Channel Id a9 83 9f
296404: 0:00:03.059 - 2 D-R(009) 00 01 64 64 08 02 80 74 01
296405: 0:00:03.059 - 2 D-X(004) 00 01 01 66
296406: 0:00:03.060 - 1 D-R(009) 00 01 6C 6C 08 02 80 2A 01
296407: 0:00:03.060 - 1 D-X(004) 00 01 01 6E
296408: 0:00:03.060 - 1 SIG-R(005) 08 02 80 2A 01
```

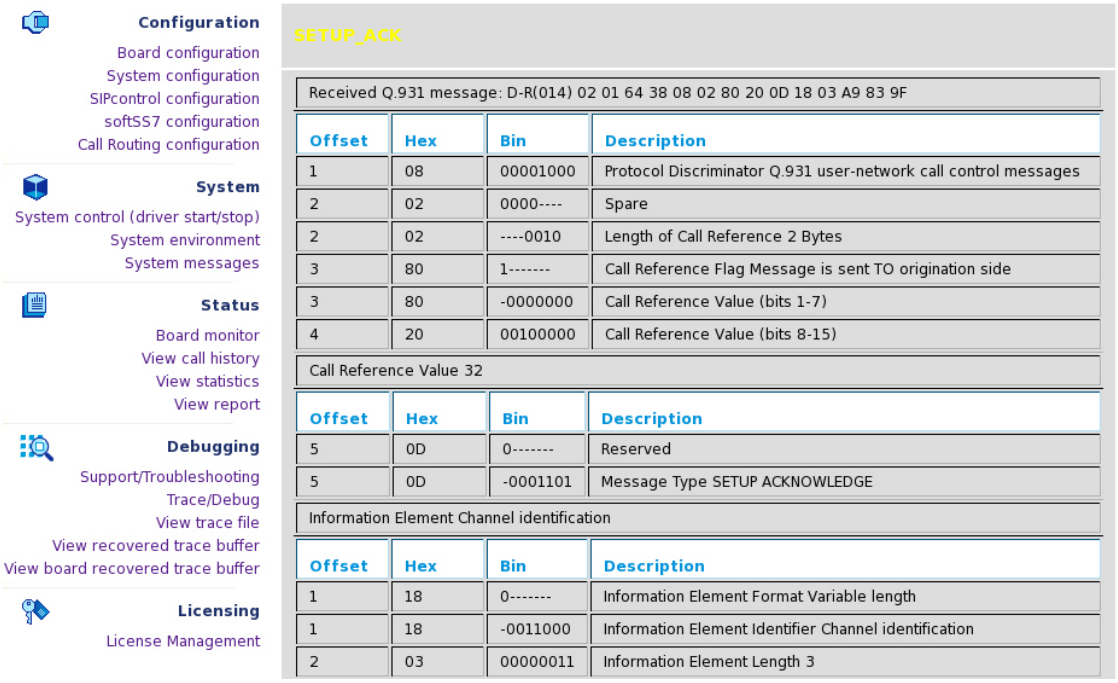
Red trace messages deal with the call release.

```
297130: 0:00:06.341 - 3 SIG-X(009) 08 02 00 72 45 08 02 80 90
297131:                     Q.931  CR0072 DISC
297132:                            Cause 80 90 'Normal call clearing'
297133: 0:00:06.342 - 3 D-X(013) 02 01 56 58 08 02 00 72 45 08 02 80 90
```

D-channel analyzer

Some of the messages are displayed as HTML links (underlined). You can receive more information about messages if you activate the link:


Configuration
Board configuration
System configuration
SIPcontrol configuration
softSS7 configuration
Call Routing configuration
System
System control (driver start/stop)
System environment
System messages
Status
Board monitor
View call history
View statistics
View report
Debugging
Support/Troubleshooting
Trace/Debug
View trace file
View recovered trace buffer
View board recovered trace buffer
Licensing
License Management
ALERT
Sent Q.931 message: SIG-X(010) 08 02 80 20 01 18 03 A9 83 9F
Offset Hex Bin Description
1 08 00001000 Protocol Discriminator Q.931 user-network call control messages
2 02 0000---- Spare
2 02 ----0010 Length of Call Reference 2 Bytes
3 80 1------- Call Reference Flag Message is sent TO origination side
3 80 -0000000 Call Reference Value (bits 1-7)
4 20 00100000 Call Reference Value (bits 8-15)
Call Reference Value 32
Offset Hex Bin Description
5 01 0------- Reserved
5 01 -0000001 Message Type ALERTING
Information Element Channel identification
Offset Hex Bin Description
1 18 0------- Information Element Format Variable length
1 18 -0011000 Information Element Identifier Channel identification
2 03 00000011 Information Element Length 3
3 A9 1------- Extension Bit Not continued
3 A9 -0------ Interface Idientifier Present Interface implicitly identified


Configuration
Board configuration
System configuration
SIPcontrol configuration
softSS7 configuration
Call Routing configuration
System
System control (driver start/stop)
System environment
System messages
Status
Board monitor
View call history
View statistics
View report
Debugging
Support/Troubleshooting
Trace/Debug
View trace file
View recovered trace buffer
View board recovered trace buffer
Licensing
License Management
SETUP_ACK
Received Q.931 message: D-R(014) 02 01 64 38 08 02 80 20 0D 18 03 A9 83 9F
Offset Hex Bin Description
1 08 00001000 Protocol Discriminator Q.931 user-network call control messages
2 02 0000---- Spare
2 02 ----0010 Length of Call Reference 2 Bytes
3 80 1------- Call Reference Flag Message is sent TO origination side
3 80 -0000000 Call Reference Value (bits 1-7)
4 20 00100000 Call Reference Value (bits 8-15)
Call Reference Value 32
Offset Hex Bin Description
5 0D 0------- Reserved
5 0D -0001101 Message Type SETUP ACKNOWLEDGE
Information Element Channel identification
Offset Hex Bin Description
1 18 0------- Information Element Format Variable length
1 18 -0011000 Information Element Identifier Channel identification
2 03 00000011 Information Element Length 3

AudioTap analyzer

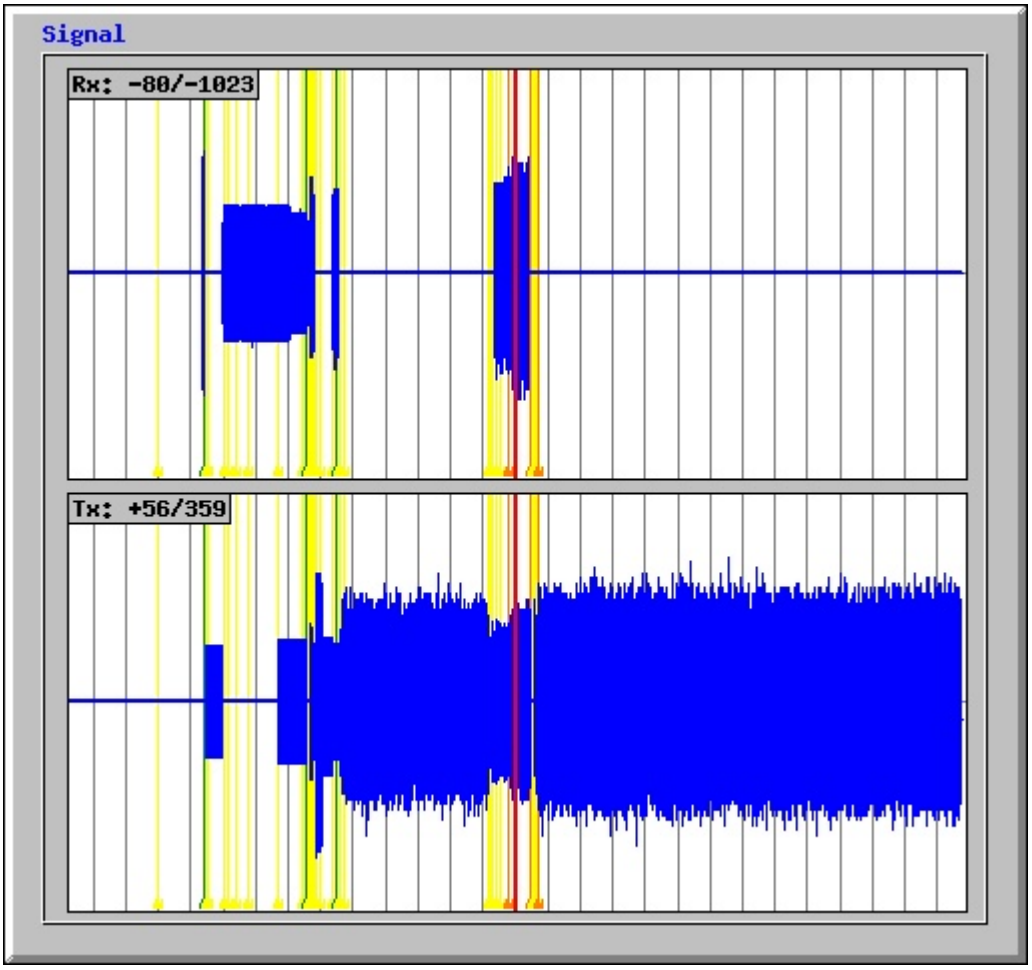
The blue trace messages (and HTML links) deal with AudioTap data. Audio taps are the audio data samples on the input (output) of the analog modem and fax DSP code combined with control information from the DSP code (events, EYE patterns). You can click the silver HTML link to start the Audio Tap Analyser that includes numerous tools.

```
244883: 0:02:56.698 - 4 [*,28] EYE C600 99EA E700 E11B 03AF 04B2 1DB5 21B8 01BB 05BE
244884: 0:02:56.698 - 4 Audio20 (704)
244885:  (0000) - [*,20] SAMPLE[] 931F 8905 B5F2 9479 DA6E 0CF2 124E EA90 0382 9574
244886:  (0020) - [*,20] SAMPLE[] 9105 3517 9566 8BFA 1483 0782 9904 800F 1E41 7005
```

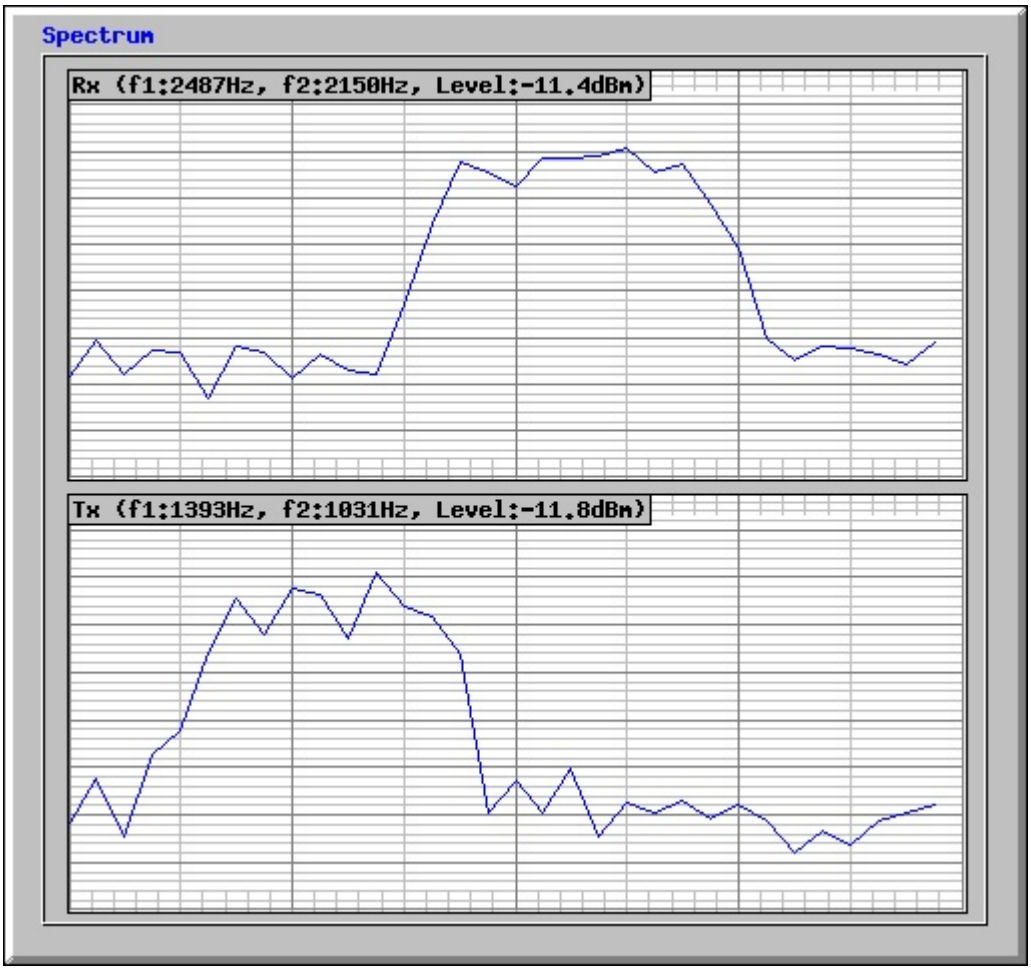
Control panel

Parameter	Value
X-Range:	800000
Y-Range:	10000
FFT window size:	64
Scroll step size:	80000
Codec:	G.711 A-Law

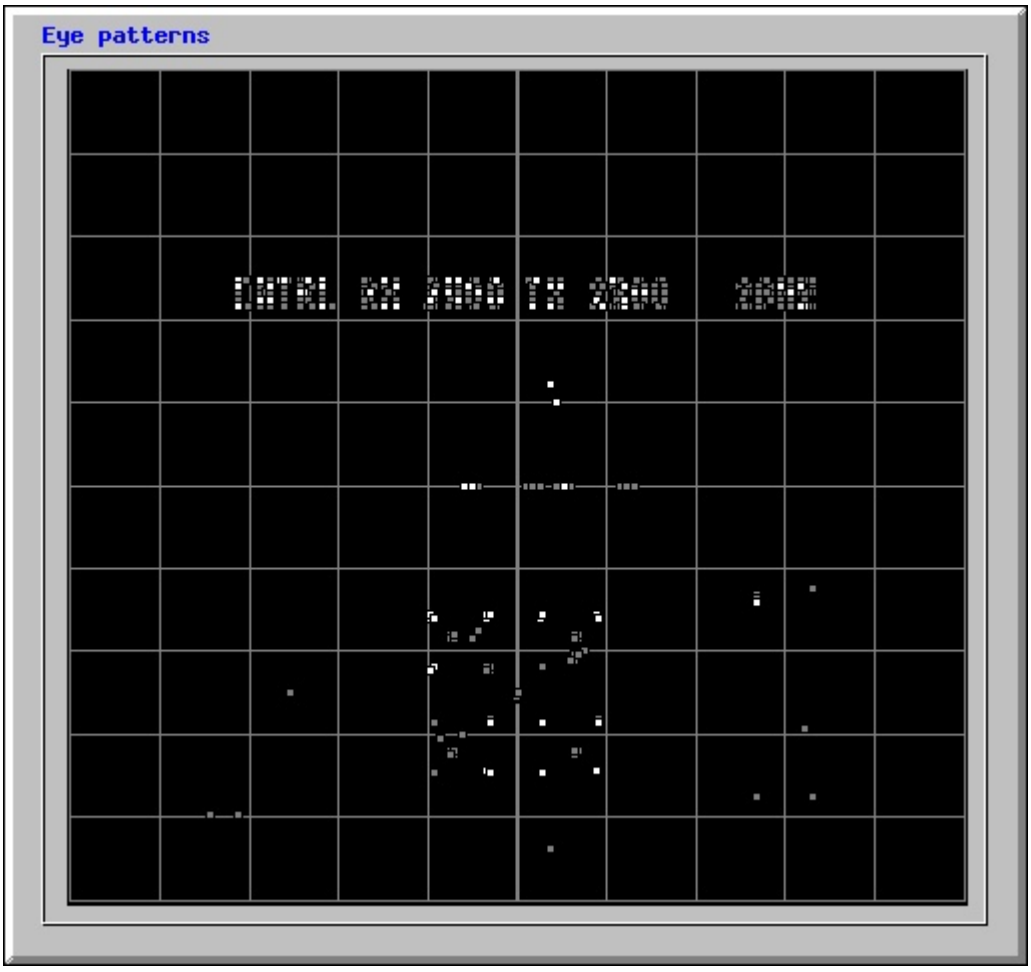
Digital oscilloscope (view timing diagram)



Digital spectral analyzer



EYE pattern diagram



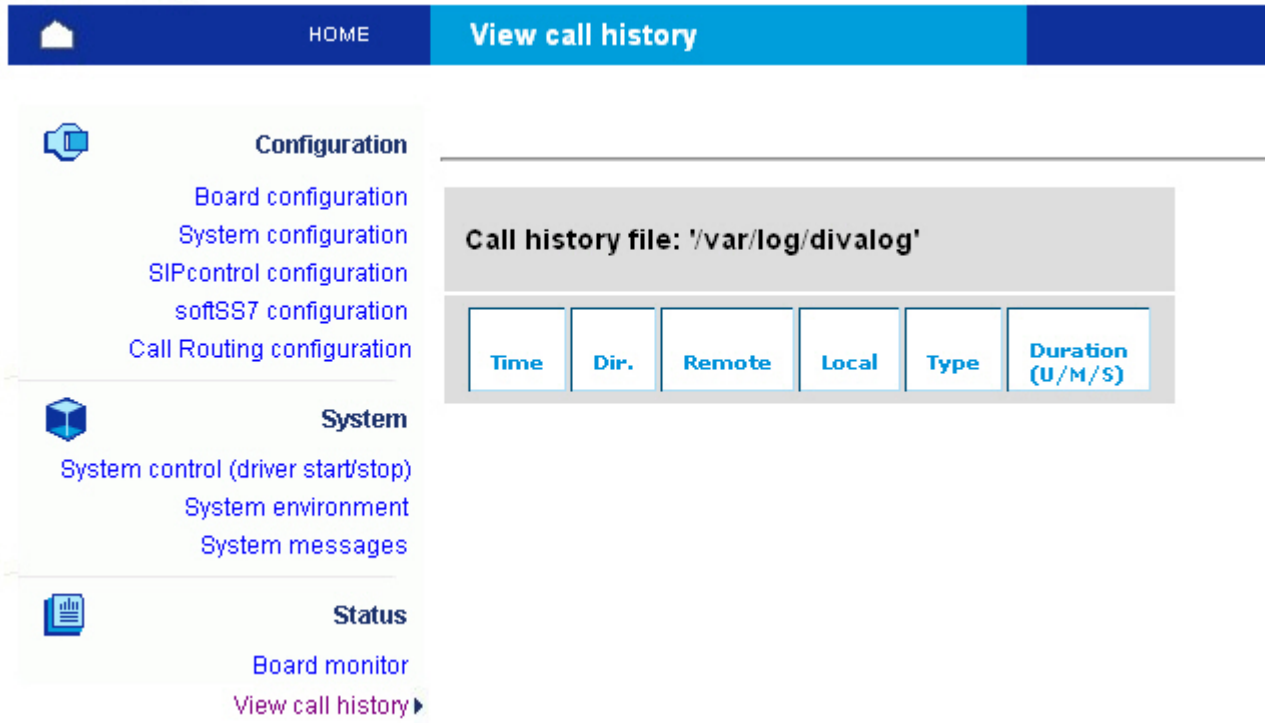
WAV file download

Moreover, it is possible to download an Audio Tap file in "WAV" file format.

View call history

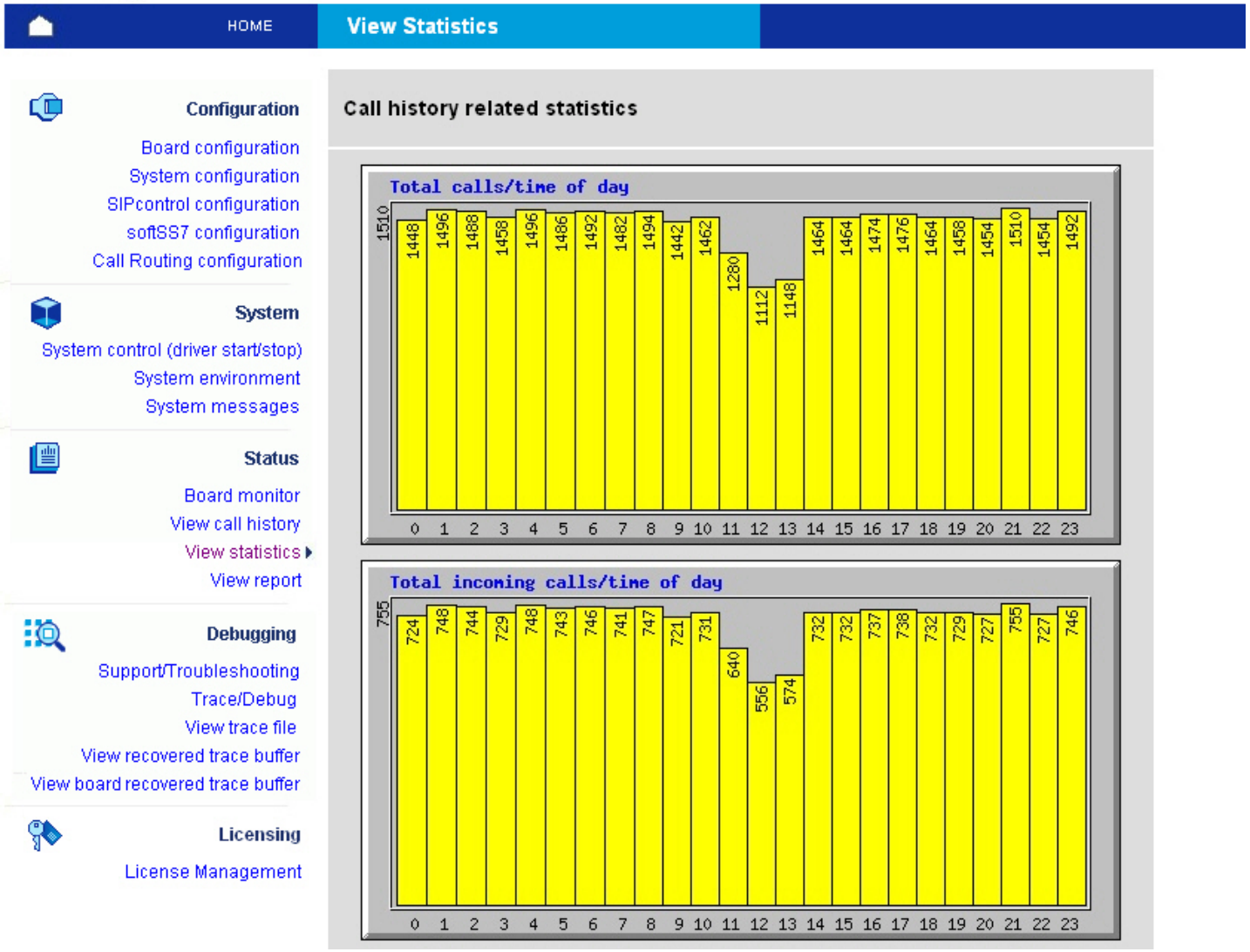
This page allows you to view the last segment (up to 10000 calls) of the call record that is stored in the `/var/log/divalog` file. This file contains the information about call time, duration, call parameters, e.g., calling/called party numbers, used protocol, transmission speed, remote fax station id, or fax features.

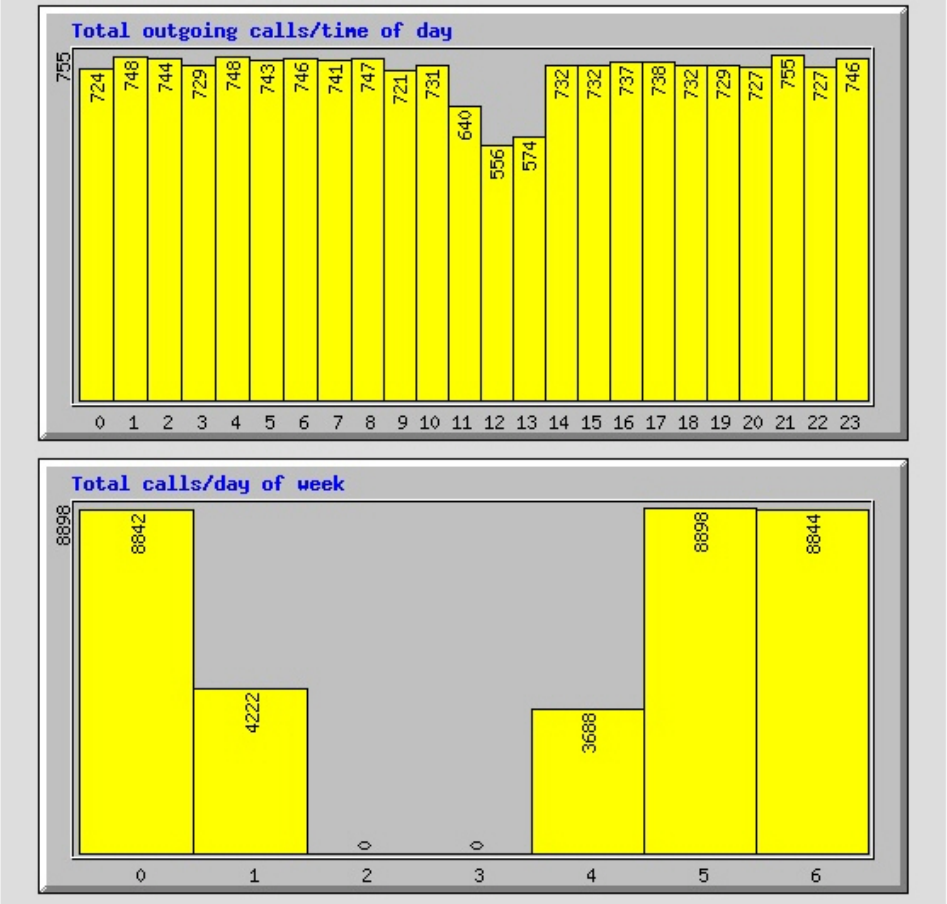
The record file of the call is stored in ASCII format and can be downloaded to a local machine. To receive more details on the format of the call record file, read about the***"divalogd" accounting utility*** on page 73.

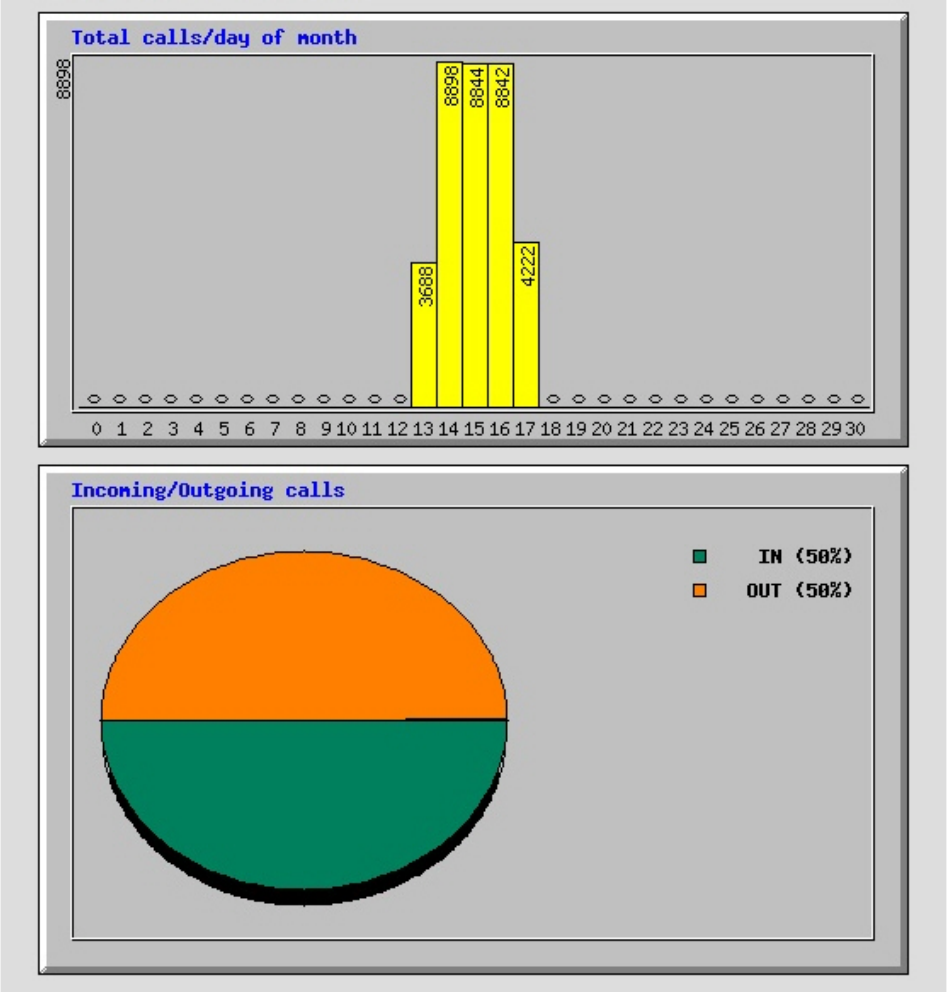


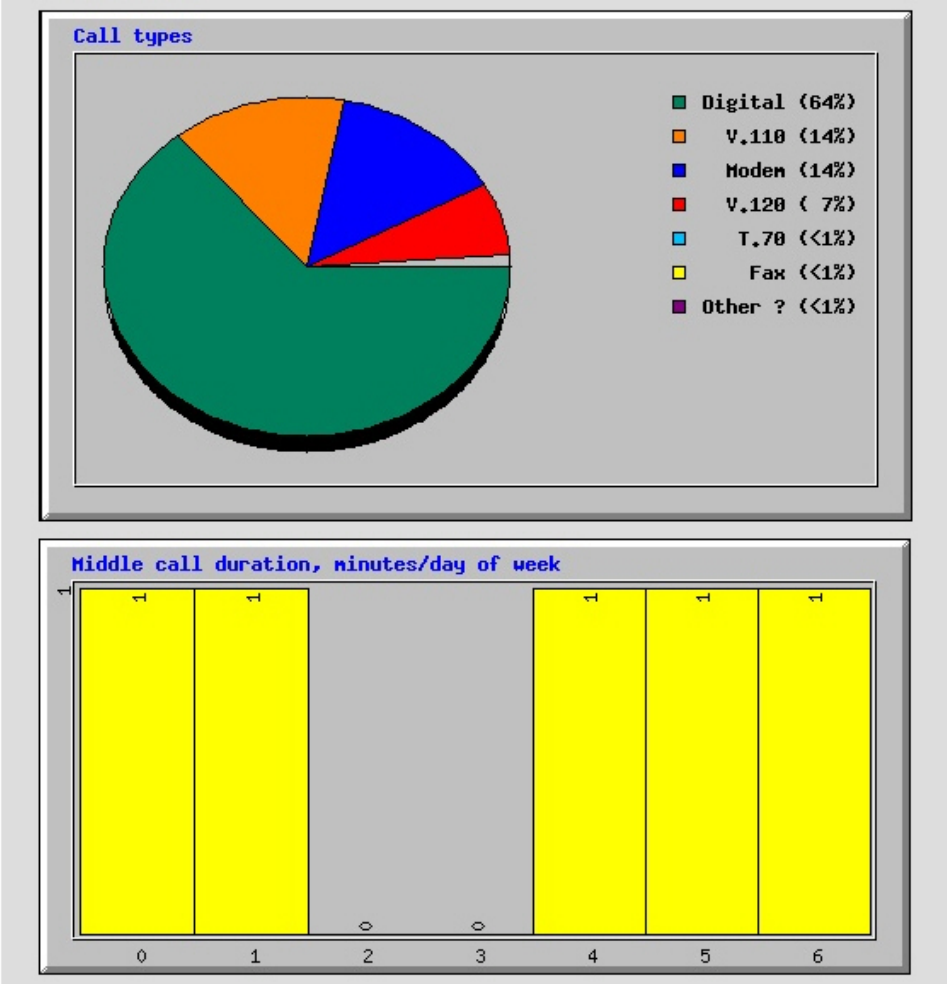
View statistics

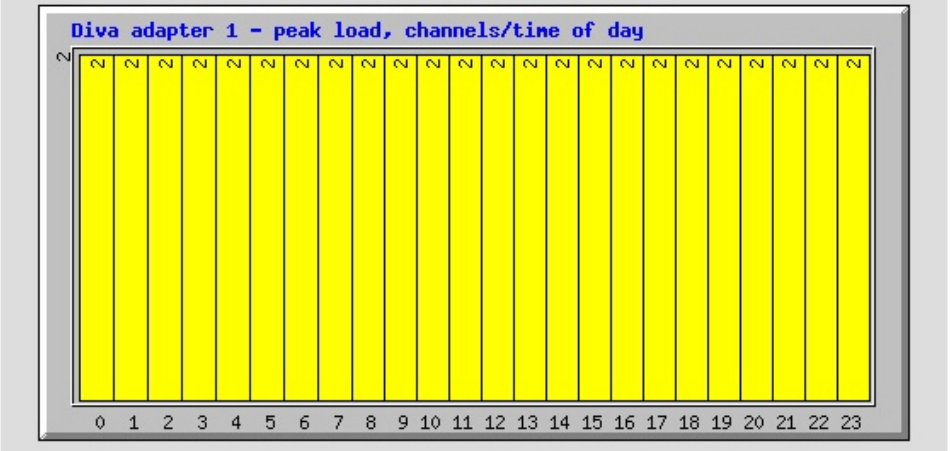
This page allows you to perform statistical analysis of the call record (call journal) files. The result of the analysis is presented as sequence of pie- and chart- diagrams (stored as JPEG files).


HOME
View Statistics
Configuration
Board configuration
System configuration
SIPcontrol configuration
softSS7 configuration
Call Routing configuration
System
System control (driver start/stop)
System environment
System messages
Status
Board monitor
View call history
View statistics
View report
Debugging
Support/Troubleshooting
Trace/Debug
View trace file
View recovered trace buffer
View board recovered trace buffer
Licensing
License Management
Call history related statistics
Total calls/time of day
1510
1448 1496 1488 1458 1496 1486 1492 1482 1494 1442 1462 1280 1112 1148 1464 1464 1474 1476 1464 1458 1454 1510 1454 1492
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Total incoming calls/time of day
755
724 748 744 729 748 743 746 741 747 721 731 640 556 574 732 732 737 738 732 729 727 755 727 746
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


Total outgoing calls/time of day
755
724
748
744
729
748
743
746
741
747
721
731
640
556
574
732
732
737
738
732
729
727
755
727
746
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Total calls/day of week
8898
8842
4222
0
0
3688
8898
8844
0 1 2 3 4 5 6


Total calls/day of month
8898
3688
8898
8844
8842
4222
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Incoming/Outgoing calls
IN (50%)
OUT (50%)

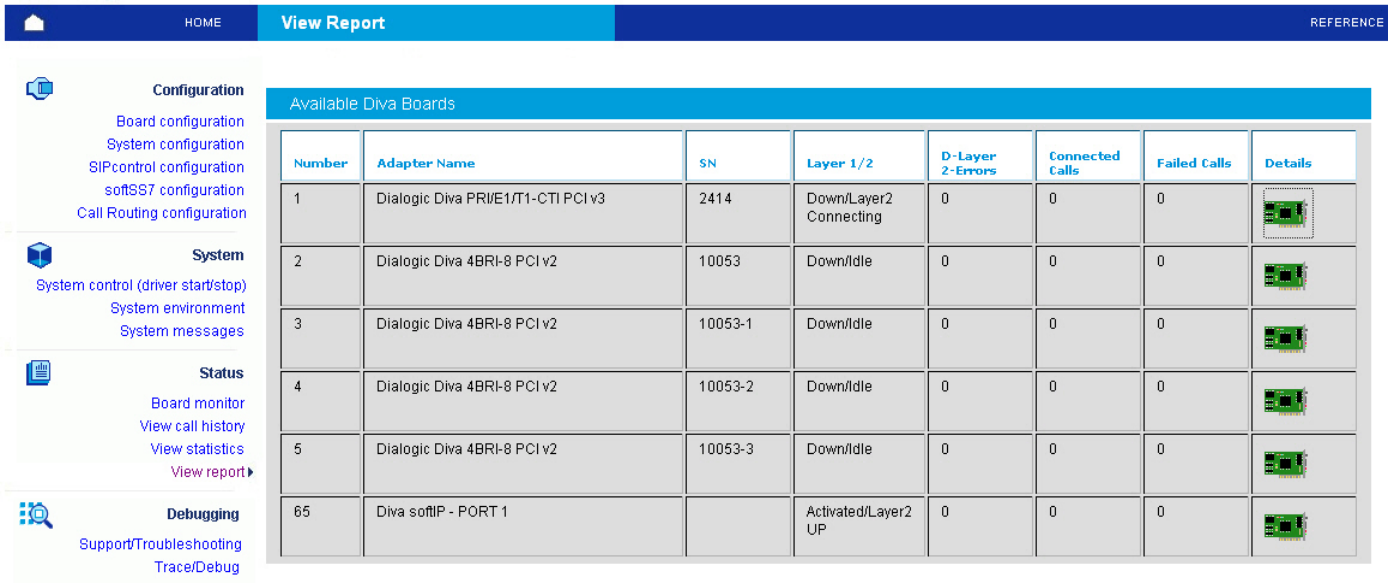

Call types
Digital (64%)
V.110 (14%)
Modem (14%)
V.120 (7%)
T.70 (<1%)
Fax (<1%)
Other ? (<1%)
Middle call duration, minutes/day of week
1
1 1 0 0 1 1 1
0 1 2 3 4 5 6


Diva adapter 1 - peak load, channels/time of day
2
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

View report

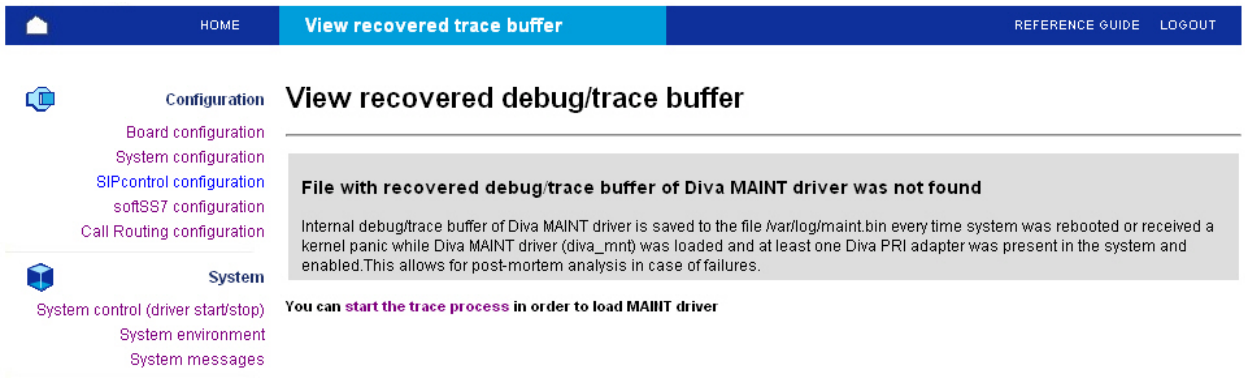
This page allows you to view the state and the cumulative statistics for the active Dialogic® Diva® Media Boards. If you click the board icon below **Details** the information listed here is displayed. The information contained in the report originates from the management interface of the Diva Media Boards.

- Link status (Layer 1 state, Layer 1 alarms, Layer 2 state).
- Total amount of Layer1/Layer2 frames/bytes transferred over the D-channel.
- Total amount of Layer1/Layer2 errors detected in the D-channel frames.
- Total amount of Layer1/Layer2 frames/bytes transferred over the B-channels.
- Total amount of Layer1/Layer2 errors detected in the B-channel frames.
- Total amount of calls.
- Total amount of successful calls.
- Total amount of failed calls, sorted by cause (User Busy, Incompatible destination, etc.).
- Total amount of successful modem calls.
- Total amount of failed modem calls, sorted by cause (Not a modem device, etc.).
- Total amount of successful fax calls.
- Total amount of failed fax calls, sorted by cause (Not a fax device, Forced by application, etc.).



View recovered debug/trace buffer

This page allows you to view or download the decoded trace file.

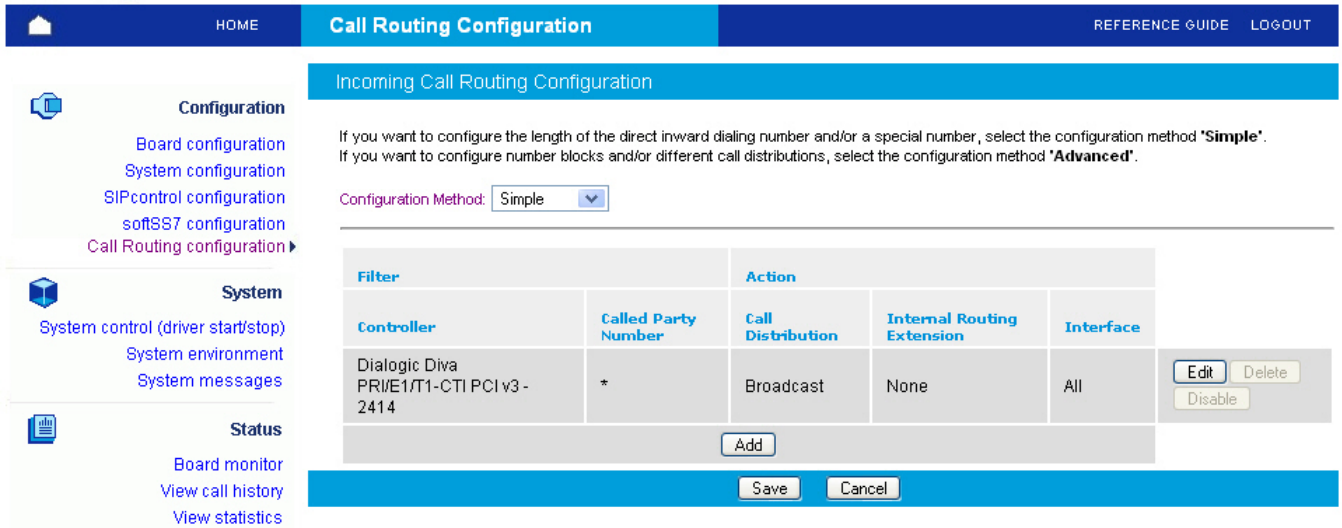

HOME
View recovered trace buffer
REFERENCE GUIDE
LOGOUT
Configuration
Board configuration
System configuration
SIPcontrol configuration
softSS7 configuration
Call Routing configuration
System
System control (driver start/stop)
System environment
System messages
View recovered debug/trace buffer
File with recovered debug/trace buffer of Diva MAINT driver was not found
Internal debug/trace buffer of Diva MAINT driver is saved to the file /var/log/maint.bin every time system was rebooted or received a kernel panic while Diva MAINT driver (diva_mnt) was loaded and at least one Diva PRI adapter was present in the system and enabled.This allows for post-mortem analysis in case of failures.
You can start the trace process in order to load MAINT driver

The internal debug/trace buffer of Dialogic® Diva® MAINT driver is saved to /var/log/maint.bin file every time system was rebooted or received kernel panic at time Diva MAINT driver (diva_mnt) was loaded and at least one Dialogic® Diva® PRI Media Board was present in the system and was in the active state.

Call routing configuration

This page allows you to configure the call routing by automatically configuring the Direct Inward Dialing (DID) length and Special Number for Dialogic® Diva® Media Boards where DID is activated in the ***Board configuration*** on page 106. To allow a more sophisticated routing configuration with the possibility to configure number ranges, different targets (CAPI/DSAPI vs. TTY), and configure different kinds of call distributions, you can select an "Advanced" configuration method.

See the online help for details of the configuration mechanism.



Product Features

Each Dialogic® Diva® Media Board provides different features and capabilities with the Dialogic® Diva® System Release software. The table below outlines the feature set of the Diva Media Boards.

Supported interfaces

The services provided by the Dialogic® Diva® Media Boards are accessible via system interfaces. The features may not be available on every supported interface. The interfaces supported by Diva Media Boards are as follows:

Supported interfaces

Interface	Description
IDI (ISDN Direct Interface)	Supports the features and capabilities of Dialogic® Diva® Media Boards.
COM Port (TTY interface)	For applications that require communication via a standard PC communication port.
CAPI 2.0	Common ISDN Application Programming Interface. A standard interface for applications to interact with Diva Media Boards.

The features list of Dialogic® Diva® ISDN Media Boards is divided in:

- ***Features of Dialogic® Diva® ISDN Media Boards via interface*** on page 133
- ***Supplementary services of Dialogic® Diva® ISDN Media Boards via interface*** on page 136
- ***Supplementary services of Dialogic® Diva® ISDN Media Boards per switch*** on page 138
- ***Features of Dialogic® Diva® Analog Media Boards*** on page 141

Features of Dialogic® Diva® ISDN Media Boards via interface

See the table on the next page for features available with the Diva ISDN Media Boards:

Feature	IDI	TTY	CAPI 2.0
Transparent HDLC, 64/56 kbps	•	•	•
Transparent (Voice) (8 bit 8 kHz A- Law/u-Law)	•	•	•
X.75	•	•	•
X.75/V.42bis	•	•	•
T.70/T.90 (T-Online)	•	•	•
V.110 (GSM) [a]	•	•	•
V.120 64/56 kbps (CompuServe)	•	•	•
V.120/V.42bis	•	•	•
Digital (Central Office) V.90 modem [a]	•	•	•
V.34+, V.90 analog modem [a]	•	•	•
SMS modem ETSI V1,V2 and auto-detection [a]	•	•	•
Dialogic® Diva® Fast Setup [a]	•	•	•
SDLC	•	•	•
V.42, V.42bis [a]	•	•	•
Change of B-channel protocol	•		•
LAPD/B	•		•
X.25, X.31, ISO 8208 in the B-channel	•		•
PIAFS 1.0, 2.0, and 2.1 [b]	•	•	•
Automatic call type and PPP frame type detection		•	
Async/sync conversion		•	
Fax Group 4 [c]	•		•
T.30 Fax Group 3 (analog) [a]	•	•	•
FAX CLASS 1, 2 [a]		•	
Fax with Error Correction Mode (ECM) [a]	•	•	•
Fax with MR (D2 coding) [a]	•	•	•
Fax with MMR (T.6 coding) [a]	•	•	•

Fax 33.6 kbps with MMR (T.6 coding) [a]	•	•	•
Fax tone detection [a]	•	•	•
Reversal of fax direction	•		•
Fax polling / fax on demand [a]	•	•	•
Fax speed and feature indication (polling and ECM) [a]	•	•	•
Fax SEP/SUB/PWD [a]	•	•	•
Fax NSF [a]	•		•
New fax header line [a]	•		•
Page formats: ISO A4, ISO B4, ISO A3 [a]	•		•
Resolution: standard, fine, super-fine, ultra-fine [a]	•		•
DTMF tone detection and transmission [a]	•		•
DTMF clamping [a]	•		•
Cross-board switching (via line interconnect)	•		•
Media mode (unknown, interactive voice, automated voice)	•		•
Echo cancellation [a]			•
Real time protocol (RTP) [a]			•
Comfort noise generation (CNG) [a]			•
Voice activity detection (VAD) [a]			•
Dynamic anti-jitter buffer [a]			•
VoIP processing [a]			•
Transparent D-channel	•		•
X.25/D-channel including AO/DI support	•		•

Notes:

[a] These features are not available with Dialogic® Diva® PRI/E1/T1 Media Boards.
[b] PIAFS support is not available with Dialogic® Diva® 2FX Media Boards.
[c] Includung T.90/ISO8208 and module mode detection.

Supplementary services of Dialogic® Diva® ISDN Media Boards via interface

For an overview of supplementary services supported by the different switch types, see ***Supplementary services of Dialogic® Diva® ISDN Media Boards per switch*** on page 138.

Supplementary Service	IDI	TTY	CAPI 2.0
MSN (multiple subscriber number)	•	•	•
DDI (direct dialing-in)	•	•	•
SUB (sub-addressing)	•	•	•
CLIP (calling line identification presentation)	•	•	•
CLIR (calling line identification restriction)	•		•
COLP (connected line identification presentation)	•		•
COLR (connected line identification restriction)	•		•
CCBS (call completion to busy subscriber)	•		•
CCNR (call completion on no reply)	•		•
KEY (keypad protocol)	•		•
TP (terminal portability)	•		•
Call forwarding unconditional	•		•
Call forwarding busy	•		•
Call forwarding no reply	•		•
Call deflection	•		•
CW (call waiting)	•		•
HOLD (hold and retrieve a call)	•		•
ECT (explicit call transfer)	•		•
AoC (advice of charge)	•		•
Three-party conference	•		•
Large conference	•		•
User-to-user signaling	•		•

Supplementary services of Dialogic® Diva® ISDN Media Boards per switch

The Dialogic® Diva® System Release software supports basic call services for the available switch types. In addition to this, it offers supplementary services for the following switch types:

- Euro-ISDN (ETSI) BRI and PRI
- 5ESS Custom (AT&T)
- 5ESS NI (Lucent/Avaya)
- DMS 100 (Nortel)
- Q.SIG

Q.SIG support is available for the derivatives ETSI-SS, ECMA-QSIG, and ETSI- QSIG. Thus, the Q.SIG switch type can be used with any PBX based on one of these derivatives. Q.SIG has been tested with a number of various switches, for example, Hicom 150, Hicom 300, Lucent Definity, Alcatel 4200, Alcatel 4400, Ericsson MD 110, Nortel Meridian, and Nortel M65xx.

The table below gives a detailed overview of the supplementary services supported by the switch types listed above. The availability of supplementary services also depends on your PBX. For detailed information on supplementary services supported by your PBX, contact the PBX manufacturer.

Supplementary Service	**Euro-ISDN (ETSI) PRI**	**Euro-ISDN (ETSI) BRI**	**Q.SIG**	**5ESS Custom, 5ESS NI, DMS 100**
MSN (multiple subscriber number)	•	•	•	• (incoming)
DDI (direct dialing-in)	•	•	•	•
SUB (sub-addressing)	•	•	•	•
CLIP (calling line identification presentation)	•	•	•	•
CLIR (calling line identification restriction)	•	•	•	•
COLP (connected line identification presentation)	•	•	•	•
COLR (connected line identification restriction)	•	•	•	•
CCBS (call completion to busy subscriber)		•	•	
CCNR (call completion on no reply)		•	•	
KEY (keypad protocol)	•	•	• [a]	•
TP (terminal portability)		•		•
Call forwarding unconditional		•		
Call forwarding busy		•		
Call forwarding no reply		•		
Call deflection		•		
CW (call waiting)		•		•

HOLD (hold and retrieve a call)	• [b]	•	• [c]	•
ECT (explicit call transfer)		•	• [d]	•
Path replacement			•	
Single-step call transfer (over CAPI deflection)			•	
AoC (advice of charge)	•	•	•	
Three-party conference		•		•
Large conference		•		•
Drop conference		•		•
User-to-user signaling	•	•	•	
Name identification services			• [e]	• [f]
Generic functional procedures (basis for supplementary services in Q.SIG environment)			•	
Common information			•	
Redirected number translation from Q.SIG to Q.931			•	
Escape message types				• [g]
Call Appearance/Call Handling (CACH) plus configuration				•
Configurable feature activators				• [h]
Network display conversion/treatment				•
Message waiting	•	•	•	•

Notes:

[a] In a Q.SIG environment, the feature is also called "Simple Dialog".
[b] HOLD is not a standard supplementary service for Euro-ISDN PRI, nevertheless some PBXs support call hold and retrieve.
[c] HOLD is not defined in Q.SIG but corresponding procedures are available.
[d] Call transfer is only possible if path replacement works for one sub-PBX.
[e] Presented by switch.
[f] Presented by the network.
[g] 5ESS custom only
[h] "5ESS NI" and DMS100 only

Features of Dialogic® Diva® Analog Media Boards

Dialogic® Diva® Analog Media Boards offer the following feature set:

- ***Call control features*** on page 141
- ***Voice and speech features*** on page 142
- ***Voice over IP support*** on page 142
- ***Switching and Conferencing*** on page 142
- ***Fax*** on page 143
- ***Data modem features*** on page 143

Call control features

- Pulse dialing
- Tone (DTMF/MF) dialing
- Busy tone detection
- Ring back tone detection
- Special Information Tone (SIT) detection
- Fax/modem detection
- Dial tone detection
- Configurable Hold/Swap/Retrieve
- Analog caller identification (via FSK and DTMF signaling)
- Collection of DTMF post-dial digits
- Configurable DTMF parsing

Voice and speech features

- G.711 coding (a-law, μ-law selectable)
- DTMF detection and generation
- DTMF clamping and filtering
- Generic tone detection and generation
- Pulse tone detection
- Full-duplex voice, "barge-in"
- Voice activity detection
- Silence detection
- Human talker detection
- Fax signal detection
- G.168 echo cancellation, up to 128 ms tail length
- Recording Automatic Gain Control (ACG)
- Pitch control
- Audio tap

Voice over IP support

- G.711 voice codec (64 kbps, μ-law, A-law)
- G.726 voice codec (32 kbps)
- GSM voice codec (13 kbps)
- G.168 echo cancellation, up to 128 ms tail length
- Adaptive jitter buffer
- Voice activity detection (VAD)
- Comfort noise generation (CNG)
- Real Time Protocol (RTP framing)

Switching and Conferencing

- On-board switching and conferencing
- Automatic Gain control (ACG)

Fax

- Support for Fax class 1 and 2
- Support for Fax Group 3, T.30
- V.17, V.29, V.27ter, V.21, V.34 Modulation
- Up to 33.600 bps with each channel (send and receive)
- Fax compression MH, MR, MMR
- Error Correction Mode (ECM)
- Reversal of fax direction
- Fax password
- Fax sub addressing
- New fax header line
- Page formats: ISO A4, B4, A3
- Standard, fine, super-fine and ultra-fine resolution
- Color fax (JPEG-Format)

Data modem features

- V.21, V.22, V.22bis, Bell 103, Bell 212A, V.32, V.32bis, V.34, V.42, V.42bis, V.90, MNP4, MNP5
- Modem with extension: V.18, V.21, Bell 103, V.23, EDT, Baudot 45, Baudot 47, Baudot 50 incl. DTMF, V.42, V.42bis

Use of the Dialogic® Diva® System Release Software in a Customized Environment

Once the .bin files (binary files) are installed, the modules still have to be translated for the running kernel.

Base drivers

The following drivers are available as source code under GPL license:

- divadidd.[k]o
- divas.[k]o
- diva_mnt.[k]o
- diva_idi.[k]o
- kernelcapi.[k]o
- divacapi.[k]o
- capi.[k]o

They can be compiled for a specific kernel using the source level package.

Build procedure

To build base Dialogic® Diva® drivers, proceed as described below:

1. Install kernel sources.
2. Create the symbolic link /usr/src/linux that points to the kernel source code.
3. Apply the kernel patches (if necessary).
4. Install the Dialogic® Diva® source level package available as download. Follow the instructions of the respective Installation Readme, which can be found on the download page.
5. Change to the directory /usr/lib/eicon/divas/src.
6. Invoke the command: ./Build.
7. The automated build procedure will compile the necessary kernel modules and utilities. Follow the instructions on the screen.
8. After successful completion of the build procedure the drivers are installed and you can proceed with the configuration as described above.

Dialogic® Diva® TTY driver

The Dialogic® Diva® TTY driver is provided only in binary form, and can only be recompiled for your own kernel using the source level package.

The Dialogic® Diva® TTY driver is provided only in binary form, and can only be recompiled for your own kernel using the source level package.

This section describes the usage of this driver with customized kernels if the aforementioned method is not applicable.

The Dialogic® Diva® TTY interface relies on a limited amount of exposed kernel services. If the appropriate services do not differ from the services the Dialogic® Diva® TTY driver was originally compiled for, then you can still use the driver with your customized kernel. Therefore, the Diva TTY driver for single processor machines is compiled without symbol version information and can be loaded in every kernel that exports the requested externals. [20] If the driver cannot be loaded due to different kernel version/name, you can try the forced module load. [21]

To do so, you can use the Dialogic® Diva® Media Board configuration utility or the **insmod -f Divatty.o** command.

Drivers for SMP (Multi-processor) systems are compiled using the same *symbol version information* settings as set by the original kernel configuration.

The Linux kernel is "monolithic". The interface between the kernel and the loadable kernel modules, especially the layout of internal kernel structures, can change depending on the current kernel configuration. It is clear that in case the kernel and the loadable kernel module have different layout of shared structures you can still load the module, but it can lead to instabilities or Oops.

Another cause for Oops and instabilities is the different processor model. The loadable kernel module which is optimized for PentiumPro CPU can cause problems if loaded in the kernel that was optimized for Pentium CPU.

In case your system becomes instable after the Diva TTY driver was loaded you can follow the general rules described below. These rules allow you to create the customized kernel which will be compatible with the Diva TTY driver:

- Select the Dialogic® Diva® RPM package with the name (kernel version) that is closest to the name of the kernel you plan use and that is suited for the CPU that you plan to use, i.e., optimized for i386, i686, ATHLON. Verify that your kernel and the Dialogic® Diva® module are compiled by same GCC compiler generation (GCC 2.XX or GCC 3.XX). [22]

You can use the command **objdump -s Divatty.o > info1.txt; objdump - s vmlinux > info2.txt** and view the context of the ".comment" sections.

- View with the **nm -u Divatty.o** command the list of TTY driver kernel services (functions) used by the Dialogic® Diva® System Release software.
- View the definition of structures that are directly used by functions the Dialogic® Diva® TTY driver imports from the kernel. Additionally, view the layout of structures used by macros that contain some of these functions (some functions are used only from macros, especially "skb_xxx", "memcpy", "memset" and similiar functions and macros. [23]

You can receive detailed information about all exported data structures, functions and the structures on which the exported functions depend on if you activate the *symbol version information*, change the kernel `Makefile` from 'genksyms' to 'genksyms -D' and execute **make modules 2>info.txt && grep Export info.txt > exports.txt**.

- Note that the kernel configuration options can change the layout of these structures.
- Now you can compare the settings of these configuration options of your customized kernel and the kernel that the Diva TTY driver was compiled for. You can use include/linux/autoconf.h files for this purpose.
- Use include/linux/autoconf.h to compare the configuration options that can affect the CPU model.

- Change the configuration of your kernel now in order to meet the configuration of the kernel that the Diva TTY driver was compiled for and recompile your kernel.

[1]

The availability of supplementary services depends on your switch or PBX.

[2]

Some of the changes, for example, "Start driver on system boot" or "Debug mode for microcode load" do not affect the state of the currently running drivers and change only the driver behavior at system or Dialogic® Diva® Media Board start. The Dialogic® Diva® WEB Configuration Wizard ignores changes of these parameters and does not prompt you to restart the Dialogic® Diva® Media Board drivers.

[3]

Restarting the Dialogic® Diva® Media Board clears the active connections of this board.

[4]

Many other options, e.g., bearer protocol, packet size, rate adaptation, are available for the TTY test. Type **/usr/lib/opendiva/divas/tty_test** for a full list or refer to the section ***tty_test utility*** on page 95 in this document.

[5]

Many other options, e.g., packet size, CPN, SubAddress, and commands are available. Type **/usr/lib/opendiva/divas/acopy2** for a full list.

[6]

Many other options, e.g., packet size, transmission speed, ECM, SEP/SUB/PWD, compression, fax ID, headline, and commands are available. Call **/usr/lib/opendiva/divas/testfax** for a full list.

[7]

It is possible to bind specific Dialogic® Diva® TTY interfaces to specific Dialogic® Diva® Media Boards. But it is not possible to bind specific Dialogic Diva TTY interfaces to specific B-channel numbers due to the fact that B-channel resources are automatically assigned by the active signaling protocol.

[8]

The pre-uninstall script contained in the rpm package stops and unloads the drivers by means of **/usr/lib/opendiva/divas/divas_stop.rc**. It also removes the symbolic links used to start the Dialogic® Diva® drivers on system startup. If the **divas_stop.rc** configuration script detects that drivers are still in use (an application or driver still accesses one of the interfaces) and cannot be stopped, the uninstalling process is aborted before any changes are applied.

[9]

If you do not know which applications or drivers access interfaces of Dialogic® Diva® drivers or you cannot stop these applications, proceed as follows:

- Execute **sh /usr/lib/opendiva/divas/cfg/cfg_util.sh 2**. This removes the symbolic links S03DIVA4LINUX from the /etc/rc.d/rc...d or /sbin.init.d/rc...d directories.
- Restart your system.

The Diva drivers are not loaded on system startup and can be uninstalled. You can identify the applications or drivers that accessed Diva drivers by error messages on the console and in the var/log/messages file.

[10]

If you do not know the name of the installed RPM package, execute **rpm -q -a | grep divas4linux** to get the package name from the database maintained by RPM.

[11]

Based on the information from the management interface it is possible to clear calls that meet specific criteria, e.g., calling party number, fax ID, and fax polling address.

[12]

The "-w" parameter can only be used with variables that have the "W" attribute.

[13]

The "-e" parameter can only be used with variables of the "MI_EXECUTE" type.

[14]

"-m", "-a", and "-g" parameters can be used in combination.

[15]

If you use the `mantool` from scripts, i.e., not interactively, add the "-b" option to turn the interactive mode off.

[16]

Whenever Dialogic® Diva® Media Board `health monitor` is running, the XLOG interface is busy and cannot be used by other utilities.

[17]

To find out the state of a logical adapter <x>, execute: **/usr/lib/opendiva/divas/divactrl load -c <x> -CardState**.

[18]

Execute this command after the Dialogic® Diva® Media Board is in a *trapped* state.

[19]

The **stunnel** is designed to work as SSL encryption wrapper between remote clients and local (xinetd-startable) or remove servers. The concept is to have non-SSL aware daemons running on your system. You can easily set them up to communicate with clients over secure SSL channels.

[20]

Drivers for SMP (Multi-processor) systems are compiled using the same *symbol version information* settings as set by the original kernel configuration.

[21]

To do so, you can use the Dialogic® Diva® Media Board configuration utility or the **insmod -f Divatty.o** command.

[22]

You can use the command **objdump -s Divatty.o > info1.txt; objdump - s vmlinux > info2.txt** and view the context of the ".comment" sections.

[23]

You can receive detailed information about all exported data structures, functions and the structures on which the exported functions depend on if you activate the *symbol version information*, change the kernel `Makefile` from 'genksyms' to 'genksyms -D' and execute **make modules 2>info.txt && grep Export info.txt > exports.txt**.